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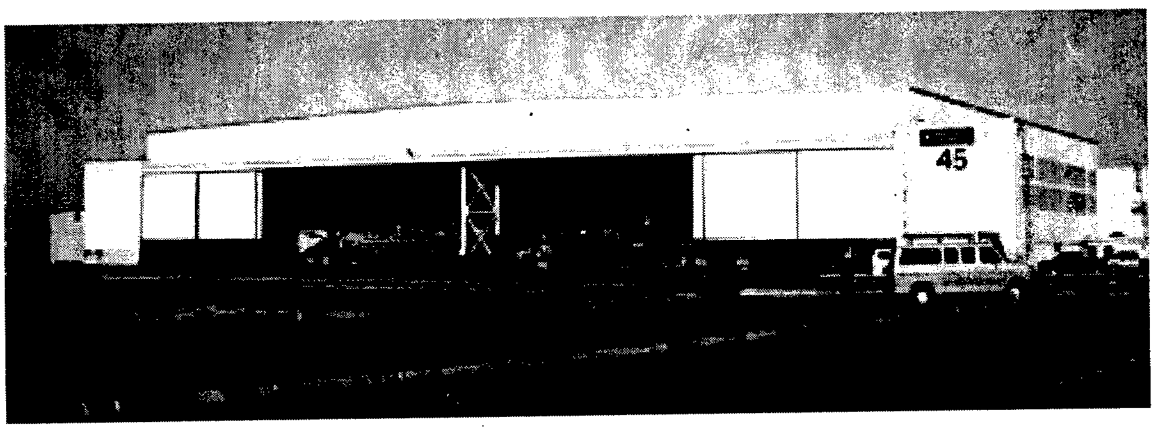
Case Study: Structural Evaluation of Steel Truss Aircraft Hangars at Corpus Christi Army Depot, Texas

Ghassan K. Al-Chaar, Jason Ericksen, and Pramod Desai



A number of steel truss aircraft hangars at Corpus Christi Army Depot (CCAD) are similar to those that have performed poorly during recent hurricanes in other parts of the country. Engineering analysis of such structures currently in use can identify structural vulnerabilities, and retrofit schemes may be developed to reduce or eliminate these vulnerabilities to severe wind loads.

The objective of this work was to evaluate the structural adequacy of four steel truss aircraft hangars at CCAD by conducting structural analyses using the most recent building code guidelines. State-of-the-art data on the behavior of steel structures under dynamic loads were utilized. The current conditions of CCAD aircraft hangars 43, 44, 45, and 47 were evaluated. Structural deficiencies and overstressed members and joints were identified, and retrofit methods to meet the requirements of current codes were developed.

Exhaustive data from the engineering analyses are included, and specific recommendations for retrofit are presented.

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A number of steel truss aircraft hangars at Corpus Christi Army Depot (CCAD) are similar to those that have performed poorly during recent hurricanes in other parts of the country. Engineering analysis of such structures currently in use can identify structural vulnerabilities, and retrofit schemes may be developed to reduce or eliminate these vulnerabilities to severe wind loads.

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Exhaustive data from the engineering analyses are included, and specific recommendations for retrofit are presented.

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Foreword

This study was performed for the Facilities Engineering and Management Division, Corpus Christi Army Depot (CCAD), TX, under Reimbursable Work Unit GK8, "Structural Evaluation of Existing Aircraft Hangars"; Military Interdepartmental Purchase Request (MIPR) MP853Z0047D110. The technical monitor was Mr. Robert Horton, SIOCC-DS-FE.

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1 Introduction

Background

Recent hurricanes have demonstrated the vulnerabilities of older structures to hurricane-level wind loads. Numerous old aircraft hangars and other structures built with steel-truss-type roofs have been damaged or demolished in recent hurricanes. Wind-related damage observed in hangars has included overstressed structural members, hangar door systems blown out of their frames, and compromised structural member connections. In many cases, progressive failure of a structure began with a failure in hangar doors or windows, followed by high variation between internal and external wind pressures that caused total collapse.

In the past, structures were built according to less stringent building codes, and over the years many have been modified to support loads in excess of their original design specifications. Also, environmental factors have over time reduced the capacities of some structural members.

A number of steel truss aircraft hangars at Corpus Christi Army Depot (CCAD) are similar to those that have performed poorly during recent hurricanes in other parts of the country. Engineering analysis of such structures currently in use can identify structural vulnerabilities, and retrofit schemes may be developed to reduce or eliminate these vulnerabilities to severe wind loads.

Objectives

The objective of this work was to evaluate the structural adequacy of four steel truss aircraft hangars at CCAD by conducting structural analyses using the most recent code guidelines.

Approach

State-of-the-art research results on the behavior of steel structures under dynamic loads were utilized. The current conditions of CCAD aircraft hangars

43, 44, 45, and 47 were evaluated. Structural deficiencies and overstressed members and joints were identified, and retrofit methods to meet the requirements of current codes were developed.

The following phases were performed to complete this project:

1. *Inspection of the four hangars.* Detailed field inspections of the structures under consideration were performed during this task. Weak links and structural deficiencies were identified. Data needed to carry out structural evaluations were collected. Repairs of deficient members were proposed to restore their strength to the original design.
2. *Execution of structural analyses.* USACERL performed structural analyses to evaluate the hangars and shops under consideration. The analyses included combined gravity, wind uplift, and equivalent lateral static analyses. Loads from wind were based on American Society of Civil Engineers, Minimum Design Loads for Building and Other Structures, ANSI/ASCE 7-95.
3. *Development of retrofit schemes.* Upgrades to members and connections subjected to failure as identified in Task 2 were developed. Technical drawings are provided with general notes on the upgrade requirements.

Units of Weight and Measure

U.S. standard units of measure are used throughout this report. A table of conversion factors for Standard International (SI) units is provided below.

SI conversion factors		
1 in.	=	2.54 cm
1 ft	=	0.305 m
1 sq ft	=	0.093 m^2
1 cu ft	=	0.028 m^3
1 lb	=	0.453 kg
1 ft-lb	=	1.356 joules
1 psi	=	6.89 kPa
°F	=	(°C x 1.8) + 32

2 Inspection of Hangars

Four types of trusses were identified as shown in Figures 2.1 and 2.2*. Every member was labeled for each type and can be located by defining the hangar number, truss type number, truss location on plan drawing, section of the truss, and a unique label. The most severe problems in the hangars were in the "door pockets". Three typical problems were identified in the door pockets: (1) the base beam of some columns were severely corroded, (2) the flange and webs of some columns at the top of concrete walls were also severely corroded, and (3) diagonal braces were either bent or loose. Recommendations for repair to return damaged members to their original condition, when necessary, will be provided in Chapter 7 following the completion of the structural analysis in Chapter 5.

Deficiencies Reported During Inspection of Hangar 43

The following notes are reported from observations during inspection. These notes are associated with strength reduction and in many cases repair is required. For location of members on plan view of the hangars see Figure 2.3. For member locations on the elevation views see Figures 2.4 and 2.5.

Notes 1 through 3 are for buckled members.

1. T1-J 7/V (Double angle 6 x 3½ x 5/16 x 180 in.)
    - bent vertical member, one angle of the double angle section
    - see Appendix A, Figure A-1.

2. T2-N 7/V (Double angle 6 x 3½ x 5/16 x 180 in.)
    - bent vertical member.

3. T2-A S21 (Double angle 3½ x 2½ x 5/16 x 360.5 in.)
    - bent double angle diagonal bracing members.

* Figures and tables are presented after the conclusion of the body text, starting on page 63.

Notes 4 through 8 are for corroded members with reduced strength. Corrosion was classified as minor or major depending on the extent of corrosion observed in the member. More frequent painting is recommended to protect structural members from further corrosions. Minor corrosion is estimated to reduce the strength of the member by 5 percent whereas major corrosion is estimated to result in 10 percent reduction in strength of members. Note 9 pertains to estimated strength reduction due to attachments loads by both welds and bolts connection to the columns. The members were not damaged, but a 5 percent strength reduction was considered.

4. All steel members in the hangar's open area
    - minor corrosion
    - 5 percent strength reduction.

5. Column N-5 ½ (8-H-31, length: 426 in.)
    - major corrosion at the column's base
    - 10 percent strength reduction.

6. Column P-5 ½ (12-I-25, length: 426 in.)
    - major corrosion at the column's base
    - 10 percent strength reduction.

7. Column A-5 ½ (8-H-31, length: 426 in.)
    - minor corrosion at the column's base
    - 5 percent strength reduction.

8. Column AA-4 ½ (12-I-25, length: 426 in.)
    - minor corrosion of the column at the height of the concrete wall, approximately 5 ft above the floor
    - 5 percent strength reduction.

9. There are many attachments by both welds and bolts connection to the columns of lines 2 and 4.
    - members do not look damaged
    - a 5 percent strength reduction was considered.

Recommendations for retrofit are provided in Chapter 8.

Deficiencies Reported During Inspection of Hangar 44

The following notes are reported from observations during inspection. These notes are associated with strength reduction and in many cases repair is required. For location of members on plan view of the hangars see Figure 2.6. For member locations on the elevation views see Figures 2.7 and 2.8.

Notes 1 through 6 are for missing, bent, or loose braces.

1. Bracing rods, 7/8-in. diameter, 180 in. long, northeast door pocket, Line AA
    - loose and bent
    - see Figure A-2.

2. Bays 19 and 20, between lines M and N (T1-M/19/V/HB to T2-N/21/V/HB single angle 4 x 3 x ¼ x 400 in. and T1-M/21/V/HB to T2-N/19/V/HB single angle 3½ x 2½ x ¼ x 400 in.)
    - two missing horizontal diagonal bracing members.

3. Horizontal diagonal brace, T2-A/21/V/HB to T1-B/23/V/HB (single angle 3½ x 2½ x ¼ x 400 in.)
    - buckled member
    - see Figure A-3.

4. T2-N S14 (double angle 3½ x 2½ x 5/16 x 339 in.)
    - buckled diagonal bracing members
    - see Figure A-4.

5. Bracing rods, 7/8-in. diameter, 180 in. long, southwest door pocket, Line P
    - loose and bent.

6. Bracing rods, 7/8-in. diameter, 180 in. long, northwest door pocket, Line P
    - loose and bent.

Notes 7 through 10 are deteriorated columns from rust.

7. Column AA – ½ (12-I-25, length: 426 in.)
    - extensive corrosion of both flanges, one flange is split, at the height of the concrete wall
    - see Figure A-5.

8. Column AA-1 ½ (12-I-40, length: 426 in.)

- extensive corrosion of the flange and web of the column, concrete is missing at the top of the wall
- see Figure A-6.

9. Column A- ½ (8-H-31, length: 426 in.) pp 5, 7
   - corrosion has split the flange of the column at the height of the concrete wall
   - see Figure A-7.

10. Column N-5 (18-I-47, length: 426 in.)
    - moderate corrosion of the column web and flange at the base
    - cracked concrete at the column base; is probably caused by corrosion that extends into the concrete
    - major corrosion of the flange at the height of the concrete wall
    - see Figure A-8.

Notes 11 through 13 are for columns with rusted base.

11. Column A-1 (18-I-47, length: 426 in.)
    - extensive corrosion of the column flange and attached plates at the base
    - see Figure A-9.

12. Column P-1 ½ (12-I-25, length: 426 in.)
    - major corrosion at the column base
    - 20 percent strength reduction.

13. Column N-5 ½ (8-H-31, length: 426 in.)
    - major corrosion at the top of the concrete wall
    - major concrete cracking at the top of the wall
    - 20 percent strength reduction
    - see Figure A-10.

Notes 14 through 19 are for members with minor corrosion.

14. Column A-4 (18-I-64, length: 554 in.)
    - minor corrosion at the column base, bent flange 2 ft above the floor
    - see Figure A-11.

15. Column A-5 (18-I-47, length: 426 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction
    - see Figure A-13.

16. Column A-5 ½ (8-H-31, length: 426 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction
    - see Figure A-12.

17. Column N-1 (18-I-47, length: 426 in.) pp 3b, 7
    - minor corrosion at the column base
    - 5 percent strength reduction
    - see Figure A-14.

Notes 18 through 22 for members with other observations.

18. Door pockets
    - water is entering the door pockets through openings in the outer wall.

19. All steel members in the hangar's open area
    - minor corrosion
    - 5 percent strength reduction.

20. T1- trusses, especially in the north half of the hangar
    - minor corrosion
    - 5 percent strength reduction.

21. There are many attachments by both welds and bolts to the columns of lines 2 and 4
    - the members do not look damaged
    - a strength reduction of 5 percent should be considered.

22. The lower portion of the brick wall in the northwest door pocket along Line N is extensively damaged.

Deficiencies Reported During Inspection of Hangar 45

The following notes are reported from observations during inspection. These notes are associated with strength reduction and in many cases repair is required. For location of members on plan view of the hangars see Figure 2.9. For member locations on the elevation views see Figures 2.10, 2.11, and 2.12.

Notes 1 through 6 are for members that are bent or loose.

1. Diagonal bracing member, T1-B/17/V/HB to T2-A/19/V/HB (single angle 3½ x 2½ x ¼ x 400 in.)
    - bent angle member, loose bolt at connection to the other bracing member.

2. T1-J 16/V (Double angle 6 x 3½ x 5/16 x 190 in.)
    - buckled vertical members.

3. Horizontal bracing member, T1-L/7/V/HB to T1-M/7/V/HB (single angle 3½ x 2½ x ¼ x 400 in.)
    - buckled member.

4. Diagonal bracing rods, 7/8-in. diameter, 180 in. long, northwest door pocket, line P
    - bent and loose rods
    - see Figures A-15, A-16, and A-17 for details.

5. Diagonal bracing rods, 7/8-in. diameter, 180 in. long, southeast door pocket, line AA
    - bent and loose rods.

6. Column N-4 (18-I-64, length: 554 in.)
    - bent flange, 2 ft above the floor.

Notes 7 through 12 are for columns with major corrosion.

7. Column D-2 (18-I-85, length: 554 in.)
    - major corrosion at the column base
    - 20 percent strength reduction.

8. Column F-2 (18-I-85, length: 554 in.)
    - major corrosion at the column base
    - 20 percent strength reduction.

9. Column N-4 (18-I-64, length: 554 in.)
    - corroded connections in the plane of line 4
    - plates and members show corrosion but the rivets do not
    - 20 percent strength reduction.

10. Column N-5 (18-I-47, length: 426 in.)
    - major corrosion at the base of the column
    - 20 percent strength reduction.

11. T3, East Braced Bay
    - major corrosion of all members
    - 20 percent reduction of strength.

12. Column G-2 (18-I-85, length: 554 in.)
    - major corrosion at the column base
    - 20 percent strength reduction.

Notes 13 through 22 are for members with strength reduction from minor corrosion.

13. T1-H, T1-K, and T1-J
    - moderate corrosion of bottom chord members
    - 10 percent strength reduction.

14. Column C-2 (18-I-85, length: 554 in.) p 10
    - moderate corrosion of the flange at the column base
    - 10 percent strength reduction.

15. Column P-4 ½ (12-I-25, length: 543 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction.

16. T3, West Braced Bay
    - heavier corrosion apparent at clear height of hangar, 32 ft above floor
    - may indicate a leak in the roof in this area, but none was visible during inspection.

17. Column M-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction.

18. Column K-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction.

19. Column D-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction.

20. Column B-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base

- 5 percent strength reduction.

21. Column B-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction.

22. Column P-4 (12-I-25, length: 426 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction.

Notes 23 through 25 are comments for analysis.

23. There are many connections, both welds and bolts, to the columns of lines 2 and 4. The members do not look damaged, but a strength reduction (5 to 10 percent) should be considered.

24. Radiant heaters along both T2 trusses and SF frames are often welded to the diagonal bracing members. The welding process seems to have had an effect on these members. There are visible heat effects on the side of the member opposite the weld.

25. All steel members in the hangar's open area exhibit minor corrosion, and a 5 percent strength reduction should be considered.

Deficiencies Reported During Inspection of Hangar 47

The following notes are reported from observations during inspection. These notes are associated with strength reduction and in many cases repair is required. For location of members on plan view of the hangars see Figure 2.13. For member locations on the elevation views see Figures 2.14, 2.15, and 2.16.

Notes 1 and 2 are related to buckled members.

1. T1-K 6/V (double angle 6 x 3½ x 5/16 x 176.7 in.)
    - buckled vertical members.

2. T2-N 21/V (double angle 6 x 3½ x 5/16 x 173.3 in.)
    - one angle of double angle section is buckled.

Notes 3 through 9 are for corroded members with deterioration in steel.

3. Column N- ½ (8-H-31, length: 426 in.)
    - column flange deteriorated by corrosion at the height of the concrete wall
    - concrete cracked at the top of the wall
    - see Figure A-18.

4. Column P-5 ½ (12-I-25, length: 426 in.)
    - column flange deteriorated by corrosion at the top of the concrete wall
    - see Figure A-19.

5. Column A- ½ (8-H-31, length: 426 in.)
    - column flange deteriorated by corrosion at the top of the concrete wall
    - see Figure A-20.

6. Column A-5 ½ (8-H-31, length: 426 in.)
    - previous repairs at the base of the column are exposed and severely corroded
    - bolts are corroded to disappearing
    - column flange deteriorated by corrosion at the top of the concrete wall
    - see Figure A-21.

7. Column P-4 ½ (12-I-25, length: 426 in.)
    - column flange deteriorated by corrosion at the top of the concrete wall.

8. Column P- ½ (12-I-25, length: 426 in.)
    - column flange deteriorated by corrosion at the top of the concrete wall
    - see Figure A-22.

9. Column N-5 ½ (12-I-25, length: 426 in.)
    - column flange deteriorated by corrosion at the top of the concrete wall.

Notes 10 through 13 are related to major corrosion.

10. Column A-1 (18-I-47, length: 426 in.)
    - major corrosion of the column at the height of the concrete wall
    - 10 percent strength reduction is assumed in analysis.

11. Column B-2 (18-I-85, length: 554 in.)
    - major corrosion at column base causing the web to delaminate into thin sheets that stick out from the web
    - repair is required.

12. Column AA-1 ½ (12-I-40, length: 426 in.)
    - major corrosion of the column at the height of the concrete wall
    - 10 percent strength reduction is assumed in analysis.

13. Column P-1 ½ (12-I-25, length: 426 in.)
    - major corrosion of previous repairs, including the base plate angles and bolts at the column base
    - repair is required.

Notes 14 through 24 are related to members with 5 percent strength reduction.

14. Column N-2 (18-I-46, length: 554 in.)
    - minor corrosion of the base plate and the column flange at its base
    - 5 percent strength reduction
    - capacity-demand ratio less than 0.5.

15. Column P-5 ½ (12-I-25, length: 426 in.)
    - minor corrosion
    - approximate strength reduction is 5 percent.

16. Column D-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

17. Column G-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

18. Column H-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

19. Column J-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

20. Column A-4 (18-I-64, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

21. Column B-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

22. Column D-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

23. Column K-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

24. Column A-5 (18-I-47, length: 426 in.)
    - minor corrosion at the column base
    - approximate strength reduction is 5 percent.

Notes 25 and 26 are general comments to protect structural members in the hangar.

25. Radiant heaters along both T2 trusses and SF frames are often welded to the diagonal bracing members. The welding process seems to have had an effect on these members. There are visible heat effects on the side of the member opposite the weld, noted especially on member T1-K 16/V (double angle 6 x 3½ x 5/16 x 190 in.).

26. Care should be taken to prevent rainwater from entering and collecting in the door pockets, as this water can damage the columns. Standing water was present in the door drains.

3 Loading

Dead Load

Roofing:	Decking (1 5/8 in. Yellow Pine)	44 pcf (AISC/ASD 1989)	6 psf
	Bur (3 ply composition)		3 psf
	Total:		9 psf

T1

Tributary area 20 ft x 6.67 ft = 133 ft^2

9 psf x 267 ft^2 = <u>1.2</u> kips at each joint along the top chord

T2

Tributary area 10 ft x 6.67 ft = 67 ft^2

9 psf x 133 ft^2 = <u>0.6</u> kips at each joint along the top chord

T3

Tributary area 20 ft x 160 ft = 3200 ft^2

9 psf x 3200 ft^2 = <u>28.8</u> kips at each joint along the top chord

SF

Tributary area 20 ft x 80 ft = 1600 ft^2

9 psf x 1600 ft^2 = <u>14.4</u> kips at each joint along the top chord

Diagonal Bracing Rods:	1 in. dia.
	2.673 ppf
	16.4 ft
Weight per Rod:	.438 kips

Roof Purlins:	P1*	11.5 ppf x 20 ft	.23 kips
	P2*	21.0 ppf x 20 ft	.42 kips
	P3*	33.0 ppf x 20 ft	.66 kips
	G1*	5.4 ppf x 20 ft	.108 kips
	P6*	83.8 ppf x 20 ft	1.676 kips

*Sizes taken from NAVFAC drawing number 147139.

Horizontal Bottom Chord Bracing:	L3*	20.8 ppf x 16.67 ft	.347 kips
	L2*	4.9 ppf x 16.67 ft	.082 kips
	1L 4x3x1/4*	5.8 ppf x 16.67 ft	.097 kips

*Size and location from NAVFAC drawing number 1353171.

Draft Curtains:	Horizontal*	1L 2.5x2.5x5/16	5.0 ppf x 20 ft	0.200 kips
	Vertical*	1L 2.5x2.5x5/16	5.0 ppf x 16 ft	0.080 kips
	22 Gauge Steel	3 ft wide	3.75 ppf x 20 ft	0.075 kips
			Total:	0.355 kips

*Sizes taken from NAVFAC drawing 1353173.

New Crane Loads:	Runway	End trucks	Hangar Assembly	Bridge Rail
	50 ppf	------	-------	80 ppf
	20 ft	------	-------	Varies
Weight:	1.00 kips	1.50 kips	0.10 kips	Varies

Old Crane Loads:	Runway	End trucks	Hangar Assembly	Bridge Rail
	15 ppf	------	------	24 ppf
	20 ft	------	------	Varies
Weight:	0.30 kips	0.45 kips	.03 kips	Varies

Each hangar has four cranes. Hangars 43 and 47 have one new crane each. In Hangars 43 and 47, the crane loading and wind loading change with the position of the truss in the hangar. Data for new crane loads came from manufacturer. No data was found for the old cranes so the loads were scaled to the same ratio as the capacities, namely 0.3. To ensure that the worst case truss type T1 was examined in analysis, different crane loads were used with different wind loads. The heavier crane load was used in loading for T1 trusses in Hangars 43 and 47 where the wind created a down force. The lighter crane dead load was used when the wind created uplift in Hangars 43 and 47. The lighter crane dead load is the only one that exists in Hangars 44 and 45.

The self-weight of the truss is included in the analysis by including the weight per foot of each member in the SAP90 program. The weight of each member is computed by the program and included in analysis. Half of the total self-weight of the T1 trusses was placed at each support point on the T3 truss.

Live Load

Roof

15 psf (taken from NAVFAC drawing number 1353177)

T1
Tributary area 20 ft x 6.67 ft = 133 ft^2
15 psf x 133 ft^2 = 2.0 kips at each joint along the top chord

T2
Tributary area 10 ft x 6.67 ft = 67 ft^2
15 psf x 67 ft^2 = 1.0 kips at each joint along the top chord

T3
Tributary area 20 ft x 160 ft = 3200 ft^2
15 psf x 3200 ft^2 = 48 kips at each joint along the top chord

SF
Tributary area 20 ft x 80 ft = 1600 ft^2
15 psf x 1600 ft^2 = 24 kips at each joint along the top chord

Truss

8 psf (taken from NAVFAC drawing number 1353177)

T1
Tributary area 20 ft x 13.3 ft = 267 ft^2
8 psf x 267 ft^2 = 2.13 kips at each joint along the top chord

T2
Tributary area 10 ft x 13.3 ft = 133 ft^2
8 psf x 133 ft^2 = 1.07 kips at each joint along the top chord

T3
Tributary area 20 ft x 160 ft = 3200 ft^2
8 psf x 3200 ft^2 = 25.6 kips at each joint along the top chord

SF
Tributary area 20 ft x 80 ft = 1600 ft^2
8 psf x 1600 ft^2 = 12.8 kips at each joint along the top chord

Roof live loads were not considered to be present during the type of storm that creates the design wind forces and were not included in the load combinations. No truss live loads were included because the nature of the wind pressures create uplift and live load would counteract this loading, therefore it is conservative to leave live load out of the calculations. The crane load was also assumed not to exist during a storm, which would create the design wind loads.

Point Load

A point load at each joint was considered to include the effects of objects hanging from the trusses, such as water pipes, radiant heaters and lighting. A load of 0.5 kips was used at each panel point along the T1 and T2 trusses. This load was determined from information gathered during the inspection and represents a slightly conservative maximum.

Wind Load

Typical Wind Analysis Calculation Using ANSI/ASCE 7-95

Basic hangar data

Location: Corpus Christi, Texas
Terrain: Coastal Area
Dimensions: 320 ft x 240 ft in plan (all hangars)
Eave height of 45.3 ft
Roof slope of 1.2 degrees (flat)
Light monitors with Hangars 43 and 47
Ridge height is 48.7 ft
Light monitor height is 59 ft

Exposure and Structure Classification

The structure is located in a coastal region (open water)
Use **Exposure Category D**
The structure function is industrial-military. Used as an essential facility.
Use Category I, Use **Importance Factor (I) = 1.15** (Table 1-1)

Basic Wind Speed

Selection of wind speed as per sec. 6.5.2 of the standard and Table 6-1.
Basic Wind Speed (V) = 130 mph (Table 6-1)

Velocity Pressures

The velocity pressures are computed using:

$$q_z = (0.00256)*(K_z)*(K_{zt})(V^2)*(I) \text{ psf} \qquad \text{Eq. 6-1 (ASCE 7-95)}$$

K_z is obtained from Table 6-3
$K_{zt} = 1.0$
$I = 1.15$
$V = 130$ mph

Then Eq. 6-1 $q_z = (0.00256)*(K_z)*(1.0)*(130^2)*(1.15)$

$$q_z = 49.75*(K_z) \text{ psf}$$

Note: since $\theta > \mathbf{10}$ **degrees,** use eave height for mean roof height ($\mathbf{h_m = 45.3}$ **ft**)

Table 3.1. Velocity Pressures, psf.

Height, ft	K_z	q_z, psf
0-15	1.03	51.2
20	1.08	53.7
30	1.16	57.7
32	1.17	58.2
40	1.22	60.7
Eave Ht. 45.3	1.24	61.7
Ridge Ht. 48.7	1.26	62.7
Light Mntr. Ht. 59	1.30	64.7

Design Wind Pressures

The design wind pressures for the main wind-force-resisting system (MWFRS) are calculated using the equation from Table 6-1 of the standard:

$$p = q*(GC_p) - q_h*(GC_{pi})$$

where:

- q = q_z for windward wall at ht. Z above the ground
- q = q_h for leeward wall, side walls, and roof
- G = 0.85 for Exposure D (sec. 6.6.1)
- C_p = Values obtained from Figure 6-3
- (GC_{pi}) = values obtained from Table 6-4

Note: when the wind is normal to the ridge, the windward roof experiences both positive and negative external pressures. Combining these external pressures with positive and negative internal pressures will result in four loading cases when wind is normal to the ridge.

When wind is parallel to the ridge, positive and negative internal pressures result in two loading cases.

Wall C_p from Figure 6-3; the pressure coefficients for the windward wall and for the side walls are 0.80 and -0.70, respectively, for all L/B ratios.

The leeward wall pressure coefficient is a function of the L/B ratio. For wind normal to the ridge, L/B = 320/240 = 1.33; therefore the leeward wall pressure is -0.43. For flow parallel to the ridge, L/B = 240/320 = 0.75.

The value of C_p is -0.50.

The wall pressure coefficients are summarized in Table 3.2.

Table 3.2. Wall C_p.

Surface	Wind Direction	L/b	C_p
Windward Wall	All	All	0.80
Leeward Wall	Normal to Ridge	1.33	-0.43
	Parallel to Ridge	0.75	-0.50
Side Wall	All	All	-0.70

Wind Normal to Ridge

h/L = 45.3/320 = 0.14 < 0.50 and since θ **< 10 degrees**

Then: windward and leeward roof Cp = -0.90 from 0-h
windward and leeward roof Cp = -0.50 from h-2h
windward and leeward roof Cp = -0.30 from >2h

Internal GC_{pi} (Table 6-4 of the standards):

Site is in hurricane-prone region having a wind speed greater than or equal to 110 mph.

Internal Pressure GC_{pi} = +0.80 (positive)
Internal Pressure GC_{pi} = -0.30 (negative)

MWFRS Net Pressures:

$$p = q*(GC_p) - q_h*(GC_{pi})$$

where:

$q = q_z$ for windward wall at ht. Z above the ground

$q = q_h$ for leeward wall, side walls, and roof

$p = q*(0.85)*(C_p) - 61.7*(+GC_{pi})$ +Ve Internal Pressure

$p = q*(0.85)*(C_p) - 61.7*(-GC_{pi})$ -Ve Internal Pressure

Typical Calculation: Windward Wall, 0-15 ft, Wind Normal to Ridge:

$p = 51.2*(0.85)*(0.8) - 61.7*(+0.8)$ +Ve Internal Pressure

$P = -14.5$ psf, with +Ve Internal Pressure

$p = 51.2*(0.85)*(0.8) - 61.7*(-0.3)$ -Ve Internal Pressure

$P = -53.33$ psf, with -Ve Internal Pressure

Table 3.3. Net MWFRS Pressures Wind Normal to Ridge.

Surface	Height(z),ft	q_z, psf	Cp	Net Pressure, psf	
				($+GC_{pi}$)	($-GC_{pi}$)
Windward Wall	0-15	51.2	0.80	-14.5	53.3
	20	53.7	0.80	-12.8	55.0
	30	57.7	0.80	-10.1	57.8
	40	60.7	0.80	-8.1	59.8
	Eave Ht. 45.3	61.7	0.80	-7.4	60.5
	Ridge Ht. 48.7	62.7	0.80	-6.7	61.2
	Light Mntr. Ht. 59	64.7	0.80	-5.4	62.5
Leeward Wall	All	61.7	-0.43	-71.9	-4.1
Side Walls	All	61.7	-0.70	-86.1	-18.2
Windward & Leeward Roof	0-h*	61.7	-0.90	-94.0	-26.0
	h-2h*	61.7	-0.50	-76.0	-7.7
	>2h*	61.7	-0.30	-65.0	+2.8

* Distance from windward edge.

Wind Parallel to Ridge

$h/L = 45.3/240 = 0.19 < 0.50$ and since θ **> 10 degrees**

Then: windward and leeward Roof Cp = -0.90 from 0-h
windward and leeward Roof Cp = -0.50 from h-2h
windward and leeward Roof Cp = -0.30 from >2h

Internal GC_{pi} (Table 6-4 of the standards):

Site is in hurricane-prone region having a wind speed greater than or equal to 110 mph.

Internal Pressure GC_{pi} = +0.80 (Positive)
Internal Pressure GC_{pi} = -0.30 (Negative)

MWFRS Net Pressures:

$$p = q*(GC_p) - q_h*(GC_{pi})$$

where :

$q = q_z$ for windward wall at ht. Z above the ground
$q = q_h$ for leeward wall, side walls, and roof
$p = q*(0.85)*(C_p) - 61.7*(+GC_{pi})$ +Ve Internal Pressure
$p = q*(0.85)*(C_p) - 61.7*(-GC_{pi})$ -Ve Internal Pressure

Typical Calculation: Windward Wall, 0-15 ft, Wind Parallel to Ridge:

p = 51.2*(0.85)*(0.8) - 61.7*(+0.8) +Ve Internal Pressure
P = -14.5 psf, with +Ve Internal Pressure
p = 51.2*(0.85)*(0.8) - 61.7*(-0.3) -Ve Internal Pressure
P = -53.33 psf, with -Ve Internal Pressure

Table 3.4. Net MWFRS Pressures: Wind Parallel to Ridge.

Surface	Height(z), ft	q_z, psf	Cp	Net Pressure, psf ($+GC_{pi}$)	Net Pressure, psf ($-GC_{pi}$)
Windward Wall	0-15	51.2	0.80	-14.5	53.3
	32	57.7	0.80	-9.8	57.8
	Eave Ht. 45.3	61.7	0.80	-7.4	60.5
	Ridge Ht. 48.7	62.7	0.80	-6.7	61.2
	Light Mntr. Ht. 59	64.7	0.80	-5.4	62.5
Leeward Wall	All	61.7	-0.50	-75.6	-7.7
Side Walls	All	61.7	-0.70	-86.1	-18.2
Windward & Leeward Roof	0-h*	61.7	-0.90	-96.6	-28.7
	h-2h*	61.7	-0.50	-75.6	-7.7
	>2h*	61.7	-0.30	-65.1	+2.8

* Distance from windward edge.

There are four wind loading conditions. Figure 3.1 shows the wind I pressure distribution, Figure 3.2 shows the wind II pressure distribution, Figures 3.3 and 3.4 show the wind III pressure distribution, and Figures 3.5 and 3.6 show the wind IV pressure distribution. When the wind is considered perpendicular to the ridge, there is no lateral effect out of the plane of the wind; there is one drawing for each of these two conditions. When the wind is considered parallel to the ridge of the hangars there is lateral loading in both directions and each condition has two drawings.

4 Modeling

Computer Modeling of Trusses

There are four different typical trusses in each of the four hangars. The trusses of Hangars 43 and 47 are similar and the trusses of Hangars 44 and 45 are similar. Therefore, two sets of the four typical trusses were modeled for this study. The locations of the trusses in plan for Hangars 43 and 47 were taken from NAVFAC drawing number 1353171. The locations in plan view of the trusses for Hangars 44 and 45 were taken from NAVFAC drawing 156838. The trusses called T1 are the main interior trusses and run north and south. There are 11 trusses of type T1 in each hangar. Two type-SF trusses, one at each end, and one type T3 truss run perpendicular to the T1 type trusses. The T1 trusses span from SF at the north and south ends of the hangar area to the center truss called T3. There are two T2 trusses, again spanning from SF to T3, on the exterior edges of the hangars, above the hangar doors. There are moment-resisting frames at both ends of the T1 and T2 trusses in Hangars 43 and 47. However, in Hangars 44 and 45, truss type T1 has only one braced bay at the north end. T3 vertically supports all T1 and T2 trusses at their centers and provides lateral bracing. The SF trusses support the T1 and T2 trusses at each end, vertically and laterally in the east-west direction. The T1 and T2 trusses are laterally braced at the bottom chord members by horizontal diagonal bracing and channel sections, as seen in NAVFAC drawings 1353171 and 156838. There are two types of SF trusses: SF-I and SF-II. Both the loading and structure of each type is distinct. SF-I is found at both ends of Hangars 43 and 47, and at the north end of Hangars 44 and 45, where there are braced bays with offices and storerooms. SF-II is found at the south end of Hangars 44 and 45, where there are no braced bays, just an outside wall. Figure 4.1 shows the plan view of Hangars 43 and 47. Figure 4.2 shows the plan view of Hangars 44 and 45. There are light monitors in Hangars 43 and 47; their locations and dimensions were taken from NAVFAC drawing 147139.

All columns are anchor-bolted into the foundation at the base and are assumed pinned. All connections are riveted and assumed pinned unless otherwise noted. Each truss was modeled in two dimensions (2D) using the SAP90 structural analysis program. Diagrams for modeling are found in Appendix B. Input files

for SAP90 structural analysis and the post-processor SAPSTL (which calculates interaction stress ratios for each member) are included in Appendix C.

The top and bottom chord members of the T1 and T2 trusses are continuous between T3 and SF supports. At the supports they are assumed pinned. All other truss members are pinned at both ends except for the main diagonals of each bay. These are continuous through the center joint and pinned at the top and bottom chords. The diagonal bracing members of the end braced bays of T2 trusses are either double- or single-angle sections, as taken from NAVFAC drawing 1353177 for Hangars 43 and 47 and NAVFAC drawing 156841 for Hangars 44 and 45. These braces are assumed pinned at both ends and continuous through the intersection. The braces are also assumed to be significant only in tension. Compressive stresses were calculated, but braces overstressed in compression were not considered for retrofit. The horizontal and vertical sections of the end bracing bays are assumed to have moment-resisting connections to one another, as seen in NAVFAC drawing 1353177. The second-floor horizontal members in the end bays of these trusses act in composite with a concrete slab and are, therefore, continuously braced against out-of-plane motion. These end bays do not exist at the south end of the T1 trusses in Hangars 44 and 45, as shown in NAVFAC drawings 156838 and 156841. The element-numbering system used for analysis of T1 trusses can be found in Figures B-1 and B-2 (Appendix B); for T2 trusses they can be found in Figures B-3 and B-4. The joint-numbering system is shown in Figures B-8 and B-9 for T1 trusses and in Figures B-10 and B-11 for T2 trusses.

The joints of the bottom and top chords of all T1 and T2 trusses were restrained from out-of-plane motion in the 2D analysis. These joints are supported laterally either by the roofing and roof purlins or by the lateral bracing in the pane of the bottom chord. The columns of the end bracing bays are braced laterally along their length by walls.

All connections in the T3 trusses are assumed rigid. Joints along the top and bottom chords were restrained from out-of-plane motion in the 2D analysis. This is justified by the fact that each joint is supported by the top or bottom chord of a T1 or T2 truss. Figure B-5 shows the element-numbering system for T3 trusses. Figure B-12 shows the joint-numbering system used for T3 trusses.

Each column of the SF Type 1 Truss is continuous along its height. Each column is laterally supported in the first floor by a wall and partially braced in the second floor by a steel handrail. The top and bottom horizontal members of the bracing are continuous through the center joint and pinned to the columns. The SF Type I was first modeled without contribution from the wall on the first floor

in lateral load resistance. It was also analyzed with infill struts that modeled the contribution of the wall on the first level. The size and stiffness of these struts were calculated using Al-Chaar's Idealized Method (see Al-Chaar 1998). Calculations are included in Appendix B. The center vertical members of the lateral bracing are pinned at the top and bottom but continuous through the center. The short horizontal members of the lateral bracing are pinned at both ends. The diagonals of the lateral bracing are pinned at the top and bottom but continuous through their intersection. The columns are braced from out-of-plane motion at the level of the top and bottom horizontal members by the connections to T1 and T2 top and bottom chords. Diagonal braces in the first and second levels were assumed pinned at both ends but moment resisting through the center. Again, these diagonals are considered only for tension. All other connections are moment-resisting. Figure B-6 shows the element-numbering system used for SF Type I. Figure B-13 shows the joint-numbering system used for SF Type I. SF Type 2 is similar except that there is no wall or handrail stiffening the columns. The exterior cladding adds some strength but does not have the same structural benefits as the wall and was not modeled with infill struts. Figure B-7 shows the element-numbering system used for SF Type II. Figure B-14 shows the joint-numbering system.

Dimensions, location, and member sections for T1 and T2 trusses in Hangars 43 and 47 were taken from NAVFAC drawing 1353177. Dimensions, location, and member sections for T1 and T2 trusses in Hangars 44 and 45 were taken from NAVFAC drawing 156841. Dimensions, location, and member sections for T3 trusses in Hangars 43, 44, 45, and 47 were taken from NAVFAC drawing 147140. Member section properties were entered using the AISC database for standard sections. Properties of members with compound multiple sections were calculated by hand and entered into the SAPSTL input file as general, non-compact sections. Members that didn't have exact matches in the database were substituted with the closest match from the database. Tables 4.1 through 4.4 show the original member sections and the member that was used for analysis from the AISC database for each truss type.

No considerations were made for modifications to the original structure. T1 and T3 trusses are modified in Hangar 47. Several T1 trusses are modified in Hangar 43. The modifications improve the strength of the structure and will not be considered unless analysis shows that members are overstressed.

Material Properties

All steel members were assumed to have a tensile yield stress of 36 ksi and a modulus of elasticity of 29,000 ksi. All rivets were assumed to be ASTM A325 steel.

Member and Joint Labels

Element- and joint-numbering systems used for analysis in SAP90 can be found in Figures B-1 through B-16.

Load Combinations

The load combination of D+P+W was found to govern for each truss. D represents the dead loads, P represents point loads used to model attached dead loads, and W represents one of the four wind loading conditions. Reversed wind loading was considered for non-symmetric T2 and T1 trusses in Hangars 44 and 45, and for both SF Type I and SF Type II trusses. The wind pressure affecting the T1 trusses varies along the length of the hangar when the wind is considered parallel to the ridge, as seen in Figures 3.4 and 3.6.

The T1 trusses were first analyzed using the maximum pressure of each of the two conditions, and they also were analyzed using the weighted average of the wind pressures. The individual pressures were multiplied by the length of the roof over which they apply. The sum of these products was divided by the total length of the roof to get the weighted average. The T3 trusses were analyzed with the stepped wind condition as shown in the drawings of Figures 3.4 and 3.6 and also with the uniform weighted average of those pressures, as calculated above. The manipulation of the wind pressures was done to get a more realistic distribution of the wind forces while keeping the same total force as the code provided.

Analysis Allowable Stresses

The ASD 9th edition was used to calculate interaction stress ratios for each member of the trusses in the SAP90 SAPSTL steel design post-processor. In each run of the analysis, all the wind loads were applied as separate loading combinations and SAPSTL calculated the maximum compressive and tensile stress ratios for each member of all combinations used. The steel was assumed

to be 36 ksi, conforming to AISC specifications. The stress ratios were calculated by ASD 89 specifications. The factors of safety were removed from the equations to yield actual member stresses.

The ASD interaction equations for combined axial compression and bending are as follows:

$$\frac{f_a}{F_a} + \frac{C_{mx} f_{bx}}{\left(1 - \frac{f_a}{F'_{ex}}\right) F_{bx}} + \frac{C_{my} f_{by}}{\left(1 - \frac{f_a}{F'_{ey}}\right) F_{by}} \leq 1.0 \qquad \text{[ASD H1-1]}$$

$$\frac{f_a}{0.60 F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \qquad \text{[ASD H1-2]}$$

If $f_a / F_a \leq 0.15$

then instead of (H1-1) or (H1-2), (H1-3) can be used:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \qquad \text{[ASD H1-3]}$$

where

F_a = axial compressive stress that would be permitted if the axial force alone existed, ksi

$$F'_e = \frac{12\pi^2 E}{23 (K l_b / r_b)^2}$$

F_b = compressive bending stress that would be permitted if bending moment alone existed, ksi

= Euler stress divided by a factor of safety, ksi (In the expression for F'_e, l_b is the actual unbraced length in the plane of bending and r_b is the corresponding radius of gyration. K is the effective length factor in the plane of bending, taken as one for beams and braces.)

f_a = computed axial stress, ksi

f_b = computed compressive bending stress at the point under consideration, ksi

C_m = Coefficient representing distribution of moment along member length and is assumed to be 1.0 for all cases except for columns in unbraced frames when they are taken as 0.85.

The ASD interaction equation for combined axial tension and bending is:

$$\frac{f_a}{F_t} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \qquad \text{[ASD H2-2]}$$

where

F_t = axial compressive stress that would be permitted if the axial force alone existed, ksi

F_b = tensile bending stress that would be permitted if bending moment alone existed, ksi

f_a = computed axial tensile stress, ksi

f_b = computed tensile bending stress at the point under consideration, ksi

The allowable axial compressive stress is determined as follows. For $Kl/r < C_c$, where Kl/r is the largest effective slenderness ratio:

$$F_a = \frac{\left[1 - \frac{(Kl/r)^2}{2C_c^2}\right]Fy}{\frac{5}{3} + \frac{3(Kl/r)}{8C_c} - \frac{(Kl/r)^3}{8C_c^3}} \qquad \text{[ASD E2-1]}$$

where $C_c = \sqrt{2\pi^2 E / F_y}$

For $Kl/r > C_c$,

$$F_a = \frac{12\pi^2 E}{23(Kl/r)^2} \qquad \text{[ASD E2-2]}$$

the allowable tensile axial stress is:

$$F_t = 0.60F_y \qquad \text{[ASD D1]}$$

The allowable bending stresses are calculated as follows:

For the out-of-plane unbraced length l, if

$$l < \frac{76b_f}{\sqrt{F_y}} < \frac{20{,}000}{(d/A_f)F_y} \qquad \text{[ASD F1-2]}$$

then for *compact* sections:

$$F_b = 0.66F_y \qquad \text{[ASD F1-1]}$$

and for *non-compact* sections:

$$F_b = 0.60F_y$$ [ASD F1-5]

If l exceeds the limits above, then for *compact* and *non-compact* sections:

$$F_b = \frac{12\times10^3 C_b}{ld/A_f} \leq 0.60F_y$$ [F1-8]

where
l = distance between cross sections braced against twist or lateral displacement of the compression flange, in.

$$C_b = 1.75 + 1.05\left(\frac{M_1}{M_2}\right) + 0.3\left(\frac{M_1}{M_2}\right)^2 \leq 2.3$$ [F1-3]

where
M_1 = the smaller bending moment at the end of the unbraced segment
M_2 = the larger bending moment at the end of the unbraced segment.

The allowable shear stress is calculated as follows:

$$F_v = 0.40F_y$$ [F4-1]

where

$$\frac{f_v}{F_v} \leq 1.0$$ [F4]

The factor of safety used for axial compression was calculated as follows:

For $Kl/r<C_c$,

$$FOS = \frac{5}{3} + \frac{3(Kl/r)}{8C_c} - \frac{(Kl/r)^3}{8C_c}$$ [E2-1]

For $Kl/r>C_c$,

$$FOS = \frac{12}{23}$$ [E2-2]

The factor of safety used for axial tension is

$$FOS = 0.60 \qquad [D1]$$

The factor of safety used for bending is

$$FOS = 0.66 \qquad [F1\text{-}1]$$

The factor of safety used for shear is

$$FOS = 0.40 \qquad [F4\text{-}1]$$

5 Structural Analysis of Members

Table 5.1 shows the analysis types done in SAP90, listed according to changing wind load and truss configuration as discussed in Chapter 4. All truss members and their corresponding sections are included in Tables 5.2 through 5.27 along with the interaction stress ratios above 0.5 and the ratios calculated without the factors of safety. See Chapter 4 for calculation of allowable stresses and the factors of safety. The ratios provided are the maximum ratios of the loading conditions for each run found in the SAPSTL output (Appendix C). The sections listed in the tables are double angles with the long edge back to back, unless labeled otherwise. Members marked with an 'x' to the left are those whose section properties had to be entered individually into the SAPSTL input (Appendix C). Member numbers correspond to the element-numbering system used in Appendix B. The member names correspond to those used for inspection, as seen in Figures 2.1 and 2.2.

The stress ratios with the factor of safety calculated by the SAPSTL post-processor are labeled as "Computed" in the tables. The stress interaction ratios with the factors of safety removed are labeled as "No FOS" in the tables. In symmetric trusses, T1 and T2 in Hangars 43 and 47, and all T3s, member stress ratios on one side also apply to its mirror image about the centerline of each truss. For non-symmetric trusses, T1 and T2 in Hangars 44 and 45, and both SF types, the stress shown for any member is the only one that applies. Members in each truss were reported as having $f_a > F_e$ by the SAPSTL post-processor, meaning the applied axial stress in the member was greater than the Euler stress reduced by a factor of safety. The interactions for these members and members with very large interaction ratios were calculated using a Mathcad program, as shown in Appendix C. The interaction stress ratios without the factors of safety were computed using the section properties of the member and the forces calculated by the SAP90 analysis. Double angles were modeled with long legs back to back and no separation between the angles. Therefore, the controlling axes of bending were in the plane of the truss and perpendicular to the truss, not about the weakest axis of a single angle.

Analysis of T1 Truss

When using the maximum wind loading condition described in Chapter 4, T1 trusses in Hangars 43 and 47 had 30 members with interaction stress ratios greater than 1.0 in tension, as computed by the post-processor program. When the factors of safety were removed from the formulas, no members remained overstressed. The same truss had 63 overstressed members in compression. After the factors of safety were removed and the MathCad program was applied to $f_a > F_e$ members, 22 members remained overstressed; most of these were main diagonals of the truss. Results are taken from Tables 5.2 and 5.3. The effect of adding knee braces was examined. See Chapter 8 for retrofit schemes.

When using the weighted-average wind loading condition described in Chapter 4, the T1 truss in Hangars 43 and 47 had only two members with interaction stress ratios of greater than 1.0 in tension. No members remained overstressed after the factors of safety were removed from the stress calculations. In compression, 47 members were overstressed as calculated by the analysis. Three members remained overstressed after the factors of safety were removed; these were #722, #591, and #592 with ratios of 1.004, 1.026, and 1.026, respectively. Member #722 is a main diagonal member and #591 and #592 are vertical members in the truss. All three members are less than 5 percent overstressed and can be considered safe. The author uses 5 percent as a rule of thumb for unsafe members to account for conservatism used in the analysis and in member material properties. Results are taken from Tables 5.4 and 5.5. The effect of knee braces with the average wind loading was investigated. See Chapter 8 for retrofit schemes.

When using the maximum wind pressure, truss T1 in Hangars 44 and 45 had 36 members with interaction stress ratios greater than 1.0 in tension. After the factors of safety were removed only member #862 remained overstressed at 1.102. This member is a second-floor horizontal member in the end bay of the truss and supports concrete slabs that will keep the beam from failing. Therefore, this member can be assumed to be safe. The T1 truss in Hangars 44 and 45 had 72 members with stress ratios greater than 1.0 in compression. Twenty-five members retained stress values greater than 1.0 after the factors of safety were removed. These members are mostly main diagonals of the truss. Results are taken from Tables 5.6 and 5.7. The effect of adding knee braces was investigated. See Chapter 8 for retrofit schemes.

When using the average wind pressure, truss T1 in Hangars 44 and 45 had 8 members with interaction stress ratios greater than 1.0. After the factors of safety were removed, only member #862 remained overstressed at 1.102 in

tension. This member is a second-floor horizontal member in the end bay of the truss and supports concrete slabs that will keep the beam from failing. Therefore, this member can be assumed to be safe. In compression, 61 members were overstressed with factors of safety. Without these factors of safety 15 members remained overstressed. Retrofit of these members is necessary. They are mostly main diagonals of the truss. Results are taken from Tables 5.8 and 5.9. The effect of adding knee braces to reduce stresses was investigated. See Chapter 8 for retrofit schemes.

Analysis of T2 Truss

T2 trusses in Hangars 43 and 47 had no members with interaction stress ratios greater than 0.5 in tension with the factors of safety included. In compression, 20 members were overstressed, and no members remained overstressed when the factors of safety were removed. Results are taken from Tables 5.10 and 5.11. The effect of adding knee braces was investigated for comparison. See Chapter 8 for retrofit schemes.

T2 trusses in Hangars 44 and 45 had no members with a stress ratio greater than 0.5 in tension with the factors of safety included. The same truss had 23 overstressed members in compression, none of which remained overstressed when the factors of safety were removed. Results are taken from Tables 5.12 and 5.13. Knee braces were investigated. See Chapter 8 for retrofit schemes.

Analysis of T3 Truss

When using the stepped wind loading as shown in Figures 3.4 and 3.6, the T3 trusses of Hangars 43 and 47 had 7 members with interaction stress ratios greater than 1.0. Without the factors of safety none of the truss members remained overstressed. In compression, 17 members were overstressed with factors of safety and 5 remained overstressed after removing them. These five members are all diagonal members of the truss. Results are taken from Tables 5.14 and 5.15. To reduce stresses, knee braces were added. See Chapter 8 for retrofit schemes.

When using the uniform weighted average wind loading, the T3 trusses of Hangars 43 and 47 had 2 members with interaction stress ratios greater than 1.0 in tension. Both ratios dropped below 1 when the factors of safety were removed. In compression, 17 members were overstressed before the factors of safety were removed and 3 were overstressed after they were removed from the

formulas. The members are #7417, #7420, and #7372 with ratios of 1.033, 1.033, and 1.005, respectively. All three values fall below the 5 percent rule of thumb and are considered safe. Members #7417 and #7420 are diagonals and #7372 is a bottom chord member. Results are taken from Tables 5.16 and 5.17. The effect of knee braces was investigated. See Chapter 8 for retrofit schemes.

When using the stepped wind loading shown in Figures 3.4 and 3.6, the T3 trusses in Hangars 44 and 45 had 7 members with interaction stress ratios greater than 1.0 in tension. No members remained overstressed after the factors of safety were removed. In the same truss 17 members were overstressed in compression. Five members remained overstressed after the factors of safety were removed. Results are taken from Tables 5.18 and 5.19. The effect of knee braces was investigated. See Chapter 8 for retrofit schemes.

When using the uniform average wind loading, the T3 trusses in Hangars 44 and 45 had 2 members with interaction stress ratios greater than 1.0 in tension. No members remained overstressed after the factors of safety were removed. In the same truss 13 members were overstressed in compression. After the factors of safety were removed, 2 members remained overstressed (#7417 and #7420). Both are diagonals and had an interaction stress ratio of 1.056, just above the 5 percent rule of thumb limit. Therefore, this member requires retrofit. Results are taken from Tables 5.20 and 5.21. The effect of knee braces was investigated. See Chapter 8 for retrofit schemes.

Analysis of Truss SF

When the effect of the walls in the lower story of the truss was ignored, 12 members of truss SF Type I had interaction stress ratios greater than 1.0 in tension. Ten remained overstressed after the factors of safety were removed. These were all diagonal bracing members with $f_a>F_e$. The exact ratios of these members were not calculated because the effect of the infill was considered necessary. In compression, 49 members had interaction stress ratios greater than 1.0. Eighteen members remained overstressed after the factors of safety were removed. Eleven of these are diagonal bracing members and are not considered for compression, only tension. The others made it necessary to model the infill as part of the lateral load resisting system. Results are taken from Tables 5.22 and 5.23.

When infill struts were used to model the effect of the walls in the first floor level, 2 members of SF type I were overstressed. These were members #7561 and #7562. Both had $f_a>F_e$ and are diagonal bracing members. Neither

remained overstressed after the MathCad program was used to calculate the interaction stress ratios without the factors of safety. In compression, 14 members were overstressed, with 6 remaining so after the factors of safety were removed. These were #7596 to #7565, #7575 and #7576. All are diagonal bracing members and are not considered to act in compression. Results are taken from Tables 5.24 and 5.25.

Eight members had interaction stress ratios greater than 1.0 in the SF type II truss in tension. None of these remained overstressed after the factors of safety were removed. In compression, 30 members were overstressed. Four of these members remained overstressed after the factors of safety were removed. The members are #11, #12, #23, and #24. All four members are diagonal braces and are not considered for compression. Results are taken from Tables 5.26 and 5.27.

The diagonal bracing members reported as having $f_a > F_e$ were examined with the MathCad program for tension only because these braces are not considered to act in compression.

6 Structural Analysis of Truss Connections

Thirty-eight connection types were investigated, several from each truss type and some from the horizontal bracing of the bottom chords of the trusses. The locations of the connection types can be found in Figures 6.1 through 6.5. No detailed drawings of the connections could be located. All connection data was taken during inspection from Hangar 45. Some of the connections were actually measured while most were drawn from the ground using comparisons with measured connections to determine spacing and sizes of the rivets. Photographs of the connections were also used to aid in the detailing of the connections. Drawings of each connection investigated can be found in Figures 6.6 through 6.15.

Rivet heads were measured because no data could be found about the rivet sizes in the connections. To determine the rivet shaft diameter, the following equation (from AISC ASD 9th edition) was used:

$$HD=1.5D + 1/8$$

where HD is the diameter of the driven rivet head in inches. No detailed analysis was done for the connections due to the lack of reliable information.

The forces used to evaluate the connections in the four truss types came from the structural analysis of each truss type in Hangar 45. Each connection type represents a group of connections on each truss. The forces used for evaluation represent the maximum forces for all loading conditions at that location, as marked in Figures 6.1 through 6.5. These forces, however, are not the maximum forces on any connection in the connection type. Table 6.1 summarizes the connection types, the members framing into the connection, the tension forces on each member, and the member's maximum stress interaction ratio from the analysis of the trusses.

Table 6.1 also includes the ratio of computed tension forces to the total shear capacity of the rivets. The shaft diameter of each rivet was calculated by taking the head diameter of the rivet and applying the equation shown above. The shear capacity of each rivet was taken from Table 1-A of AISC ASD 9th edition

according to its estimated size. The rivets were investigated for both A307 and A325 steels. It is most likely that the rivets are A325. The shear capacity of each rivet was then multiplied by the number of bolts connecting each member to get the total shear capacity of the rivets. For A325 bolts, no connections exceeded a ratio of 1.0. The highest ratio calculated was 0.771 for member #7741 of connection type 34. For A307 bolts, five members exceeded a capacity ratio of 1.0. However, the high probability that the rivets are A325 steel, taken together with the fact that all the member interaction stress ratios are low, leads to the judgment that the connections are strong enough to resist the analysis loads used in this investigation.

7 Repair of Deficient Members Observed During Inspection

This chapter outlines immediate action needed, based on observations during inspection, to return damaged members to their original condition. Proposed repair for all deficient members is presented here with illustrative drawings. General notes for proposed repair techniques are shown in Figure D-1 (Appendix D).

Repair in Hangar 43

Notes 1 through 3 are for the buckled members presented in Chapter 2. For Note 1, repair as shown in Figure D-2. For Notes 2 and 3, it is recommended to replace the damaged existing members with identical or slightly stronger members. The new members shall have the same connection details as the existing members with the same sizes and configurations of bolts and welds (if they exist).

1. T1-J 7/V (Double angle 6 x 3½ x 5/16 x 180 in.)
   - bent vertical member, one angle of the double angle section
   - repair as shown in Figure D-2
   - capacity-demand ratio is less than 0.5.

2. T2-N 7/V (Double angle 6 x 3½ x 5/16 x 180 in.)
   - bent vertical member
   - capacity-demand ratio is less than 0.5.

3. T2-A S21 (Double angle 3½ x 2½ x 5/16 x 360.5 in.)
   - bent double angle diagonal bracing members
   - capacity-demand ratio is 0.709.

Notes 4 through 8 are for corroded members with reduced strength. Corrosion was classified as minor or major depending on the extent of corrosion observed in the member. More frequent painting is recommended to protect structural members from further corrosion. Minor corrosion is estimated to reduce the strength of the member by 5 percent whereas major corrosion is

estimated to result in a 10 percent reduction in strength of the members. Note 9 pertains to strength reduction due to load attachments by both welded and bolted connections to the columns. The members reported in Note 9 were not damaged, but a 5 percent strength reduction was considered.

4. All steel members in the hangar's open area
   - minor corrosion
   - 5 percent strength reduction
   - since capacity-demand ratio is less than 0.5, paint only as recommended in Figure D-1.

5. Column N-5 ½ (8-H-31, length: 426 in.)
   - major corrosion at the column's base
   - 10 percent strength reduction
   - analysis revealed that this column has a significant margin of safety; thus, paint only as recommended in Figure D-1.

6. Column P-5 ½ (12-I-25, length: 426 in.)
   - major corrosion at the column's base
   - 10 percent strength reduction
   - analysis revealed that this column has a significant margin of safety; thus, paint only as recommended in Figure D-1.

7. Column A-5 ½ (8-H-31, length: 426 in.)
   - minor corrosion at the column's base
   - 5 percent strength reduction
   - since capacity-demand ratio is less than 0.5 as a result of the analysis, paint only as recommended in Figure D-1.

8. Column AA-4 ½ (12-I-25, length: 426 in.)
   - minor corrosion of the column at the height of the concrete wall, approximately 5 ft above the floor
   - 5 percent strength reduction
   - analysis revealed that this column has a significant margin of safety; thus, paint only as recommended in Figure D-1.

9. There are many attachments by both welds and bolted connections to the columns of lines 2 and 4. The members do not look damaged, but a 5 percent strength reduction was considered. Since capacity-demand ratio is 0.364, no action is recommended for this note.

Repair in Hangar 44

Notes 1 through 6 are for missing, bent, or loose braces.

1. Bracing rods, 7/8-in. diameter, 180 in. long, northeast door pocket, Line AA
   - loose and bent
   - tighten loose rods and replace existing bent rods with identical or slightly stronger members; the new members shall have the same connection details as the existing members with the same sizes and configurations of bolts and welds.

2. Bays 19 and 20, between lines M and N (T1-M/19/V/HB to T2-N/21/V/HB single angle 4 x 3 x ¼ x 400 in. and T1-M/21/V/HB to T2-N/19/V/HB single angle 3½ x 2½ x ¼ x 400 in.)
   - two missing horizontal diagonal bracing members
   - replace the missing members with members that are identical or slightly stronger than the original members, as taken from drawings; the new members shall have the same connection details as the original member with the same sizes and configurations of bolts and welds.

3. Horizontal diagonal brace, T2-A/21/V/HB to T1-B/23/V/HB (single angle 3½ x 2½ x ¼ x 400 in.)
   - buckled member
   - repair as shown in Figure D-3.

4. T2-N S14 (double angle 3½ x 2½ x 5/16 x 339 in.)
   - buckled diagonal bracing members
   - replace the existing members with identical or slightly stronger members; the new members shall have the same connection details as the existing members with same sizes and configurations of bolts and welds
   - capacity-demand ratio 0.545.

5. Bracing rods, 7/8-in. diameter, 180 in. long, southwest door pocket, Line P
   - loose and bent
   - tighten loose rods and replace existing bent rods with identical or slightly stronger members; the new members shall have the same connection details as the existing members with the same sizes and configurations of bolts and welds.

6. Bracing rods, 7/8-in. diameter, 180 in. long, northwest door pocket, Line P
   - loose and bent

- tighten loose rods and replace existing bent rods with identical or slightly stronger members; the new members shall have the same connection details as the existing members with the same sizes and configurations of bolts and welds.

Notes 7 through 10 are for columns deteriorated by corrosion.

7. Column AA – ½ (12-I-25, length: 426 in.)
   - extensive corrosion of both flanges, one flange is split at the height of the concrete wall
   - repair as shown in Figure D-4.

8. Column AA-1 ½ (12-I-40, length: 426 in.)
   - extensive corrosion of the flange and web of the column, concrete is missing at the top of the wall
   - repair as shown in Figure D-4.

9. Column A- ½ (8-H-31, length: 426 in.) pp 5, 7
   - corrosion has split the flange of the column at the height of the concrete wall
   - repair as shown in Figure D-4
   - capacity-demand ratio is less than 0.5.

10. Column N-5 (18-I-47, length: 426 in.)
    - major corrosion of the column web and flange at the base, with cracked concrete at the column base; corrosion most likely extends into the concrete, causing the concrete cracking
    - major corrosion of the flange at the height of the concrete wall
    - capacity-demand ratio less than 0.5
    - repair as shown in Figure D-5.

Notes 11 through 13 are for columns with rusted base.

11. Column A-1 (18-I-47, length: 426 in.)
    - major corrosion of the column flange and attached plates at the base
    - capacity-demand ratio is less than 0.5
    - repair as shown in Figure D-5.

12. Column P-1 ½ (12-I-25, length: 426 in.)
    - major corrosion at the column base
    - repair as shown in Figure D-5.

13. Column N-5 ½ (8-H-31, length: 426 in.)
    - major corrosion at the top of the concrete wall
    - major concrete crack at the top of the wall
    - replace the missing portion of the concrete wall using adequate reinforcement to ensure a strong connection to the existing wall
    - paint as recommended in Figure D-1
    - since capacity-demand ratio is less than 0.5, no further repair is required.

Notes 14 through 19 are for members with minor corrosion.

14. Column A-4 (18-I-64, length: 554 in.)
    - minor corrosion at the column base, bent flange 2 ft above the floor
    - paint as recommended in Figure D-1
    - since capacity-demand ratio is less than 0.5, no further repair is required.

15. Column A-5 (18-I-47, length: 426 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction
    - paint as recommended in Figure D-1
    - since capacity-demand ratio is less than 0.5, no further repair is required.

16. Column A-5 ½ (8-H-31, length: 426 in.)
    - minor corrosion at the column base
    - 5 percent strength reduction
    - paint as recommended in Figure D-1
    - since capacity-demand ratio is less than 0.5, no further repair is required.

17. Column N-1 (18-I-47, length: 426 in.)
    - minor corrosion at the column base
    - 10 percent strength reduction
    - paint as recommended in Figure D-1
    - since capacity-demand ratio is less than 0.5, no further repair is required.

Notes 18 through 22 for members with other observations.

18. Door pockets
    - water is entering the door pockets through openings in the outer wall
    - the openings need to be closed and sealed.

19. All steel members in the hangar's open area
    - minor corrosion
    - 5 percent strength reduction
    - paint all steel surfaces.

20. T1- trusses, especially in the north half of the hangar
    - minor corrosion
    - 5 percent strength reduction
    - paint as recommended in Figure D-1.

21. There are many attachments by both welds and bolts to the columns of lines 2 and 4. The members do not look damaged, but a strength reduction of 5 percent should be considered.
    - maximum capacity-demand ratio is 0.364 for column line 2
    - maximum capacity-demand ratio is 0.582 for column line 4
    - since capacity-demand ratios are low, no repair is required.

22. The lower portion of the brick wall in the northwest door pocket along Line N is extensively damaged.
    - replace with reinforced concrete or repair by applying 1 in. coat of concrete over the brick.

Repair in Hangar 45

Notes 1 through 6 are for bent or loose members.

1. Diagonal bracing member, T1-B/17/V/HB to T2-A/19/V/HB (single angle 3½ x 2½ x ¼ x 400 in.)
    - bent angle member, loose bolt at connection to the other bracing member
    - replace the damaged existing member with an identical or slightly stronger member; the new member shall have the same connection details as the existing member with the same sizes and configurations of bolts and welds
    - replace the loose bolt.

2. T1-J 16/V (Double angle 6 x 3½ x 5/16 x 190 in.)
   - buckled vertical members
   - replace the existing member with an identical or slightly stronger member; the new member shall have the same connection details as the existing member with the same sizes and configurations of bolts and welds
   - capacity-demand ratio is 0.790.

3. Horizontal bracing member, T1-L/7/V/HB to T1-M/7/V/HB (single angle 3½ x 2½ x ¼ x 400 in.)
   - buckled member
   - replace the existing member with an identical or slightly stronger member; the new member shall have the same connection details as the existing member with the same sizes and configurations of bolts and welds.

4. Diagonal bracing rods, 7/8-in. diameter, 180 in. long, northwest door pocket, line P
   - bent and loose rods
   - if bent, replace the existing rod with an identical or slightly stronger member; the new member shall have the same connection details as the existing member with the same sizes and configurations of bolts and welds; tighten the rod if it is loose.

5. Diagonal bracing rods, 7/8-in. diameter, 180 in. long, southeast door pocket, line AA
   - bent and loose rods
   - if bent, replace the existing rod with an identical or slightly stronger member; the new member shall have the same connection details as the existing member with the same sizes and configurations of bolts and welds; tighten the rod if it is loose.

6. Column N-4 (18-I-64, length: 554 in.)
   - bent flange 2 ft above the floor
   - ignore if factor of safety is greater than 1.2
   - capacity-demand ratio is less than 0.5 (factor of safety is greater than 2.0).

Notes 7 through 12 are for columns with major corrosion.

7. Column D-2 (18-I-85, length: 554 in.)
   - major corrosion at the column base; 20 percent strength reduction

- capacity-demand ratio is 0.867
- repair as shown in Figure D-5.

8. Column F-2 (18-I-85, length: 554 in.)
    - major corrosion at the column base
    - capacity-demand ratio is 0.867
    - repair as shown in D-5.

9. Column N-4 (18-I-64, length: 554 in.)
    - corroded connections in the plane of line 4, both the plates and members show corrosion while the rivets do not
    - capacity-demand ratio is less than 0.5
    - paint as recommended in Figure D-1.

10. Column N-5 (18-I-47, length: 426 in.)
    - major corrosion at the base of the column
    - capacity-demand ratio is less than 0.5
    - paint as shown in Figure D-1.

11. T3, East Braced Bay
    - major corrosion of all members
    - capacity-demand ratio 0.558
    - paint as shown in Figure D-1.

12. Column G-2 (18-I-85, length: 554 in.)
    - major corrosion at the column base
    - capacity-demand ratio is 0.867
    - repair as shown in Figure D-5.

Notes 13 through 22 are for members with strength reduction due to minor corrosion.

13. T1-H, T1-K, and T1-J
    - corrosion of bottom chord members
    - clean and paint members as recommended in Figure D-1
    - capacity-demand ratio is 0.863.

14. Column C-2 (18-I-85, length: 554 in.)
    - major corrosion of the flange at the column base
    - capacity-demand ratio is 0.867
    - paint as recommended in Figure D-1.

15. Column P-4 ½ (12-I-25, length: 543 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - paint as recommended in Figure D-1.

16. T3, West Braced Bay
    - major corrosion at the clear height of the hangar, 32 ft above the floor, may indicate a leak in the roof in this area, although none was visible during inspection
    - capacity-demand ratio is less than 0.563
    - paint as recommended in Figure D-1.

17. Column M-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - capacity-demand ratio is 0.897 with knee braces (high bending stress)
    - paint as recommended in Figure D-1.

18. Column K-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - capacity-demand ratio is 0.897 with knee braces
    - paint as recommended in Figure D-1.

19. Column D-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - capacity-demand ratio is 0.897 with knee braces
    - paint as recommended in Figure D-1.

20. Column B-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - capacity-demand ratio is 0.897 with knee braces
    - paint as recommended in Figure D-1.

21. Column B-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - capacity-demand ratio is 0.867
    - paint as recommended in Figure D-1.

22. Column P-4 (12-I-25, length: 426 in.)
    - minor corrosion at the column base; 5 percent strength reduction
    - paint as recommended in Figure D-1.

Notes 23 through 25 are comments for analysis.

23. There are many connections, both welds and bolts, to the columns of lines 2 and 4. The members do not look damaged, but a strength reduction (5 to 10 percent) should be considered. No action is recommended.

24. A number of radiant heaters along both T2 trusses and SF frames are welded to the diagonal bracing members. The welding process seems to have had an effect on these members. There are visible heat effects on the side of the member opposite the weld. Isolate these structural members from the heaters.

25. All steel members in the hangar's open area
    - minor corrosion
    - 5 percent strength reduction
    - paint all steel surfaces as recommended in Figure D-1.

Repair in Hangar 47

Notes 1 and 2 are related to buckled members.

1. T1-K 6/V (double angle 6 x 3½ x 5/16 x 176.7 in.)
    - buckled vertical members
    - replace the existing members with identical or slightly stronger members; the new members should have the same connection details as the existing members with the same sizes and configurations of bolts and welds
    - capacity-demand ratio is less than 0.5.

2. T2-N 21/V (double angle 6 x 3½ x 5/16 x 173.3 in.)
    - one angle of double angle section is buckled
    - replace the damaged member with an identical or slightly stronger member; the new member should have the same connection details as the existing member with the same sizes and configurations of bolts and welds
    - capacity-demand ratio is less than 0.5.

Notes 3 through 9 are for corroded members with deterioration in steel.

The locations of corrosion that resulted in a split in the steel columns are summarized in Figure D-6 and repair is recommended in Figure D-4 unless otherwise noted.

3. Column N- ½ (8-H-31, length: 426 in.)
   - deterioration on a column flange from corrosion at the height of the concrete wall
   - concrete cracked at the top of the wall
   - capacity-demand ratio is less than 0.5.

4. Column N-5 ½ (12-I-25, length: 426 in.)
   - deterioration on a column flange from corrosion at the top of the concrete
   - capacity-demand ratio is less than 0.5.

5. Column A- ½ (8-H-31, length: 426 in.)
   - deterioration on column flanges from corrosion at the top of the concrete wall
   - capacity-demand ratio is less than 0.5.

6. Column A-5 ½ (8-H-31, length: 426 in.)
   - previous repairs at the base of the column are exposed and corroded, the bolts are corroded to disappearing
   - deterioration on column flanges from corrosion at the top of the concrete wall
   - repair as shown in Figures D-4 and D-5
   - capacity-demand ratio is less than 0.5.

7. Column P-4 ½ (12-I-25, length: 426 in.)
   - deterioration appeared on a column flange from corrosion at the top of the concrete.

8. Column P- ½ (12-I-25, length: 426 in.)
   - deterioration appeared on a column flange from corrosion at the top of the concrete.

9. Column M-5 ½ (12-I-25, length: 426 in.)
   - deterioration appeared on column flanges from corrosion at the top of the concrete wall
   - capacity-demand ratio is less than 0.5.

Notes 10 through 13 resulted from major corrosion. A 10 percent reduction in strength for Notes 10 and 12 is recommended, whereas repair is required for Notes 11 and 13.

10. Column A-1 (18-I-47, length: 426 in.)

- major corrosion of the column at the height of the concrete wall; 10 percent strength reduction is used in analysis
- capacity-demand ratio is less than 0.5
- paint as recommended in Figure D-1.

11. Column B-2 (18-I-85, length: 554 in.)
    - major corrosion at the column's base causing the web to delaminate into thin sheets that stick out from the web
    - capacity-demand ratio is 0.576
    - repair as shown in Figure D-5.

12. Column AA-1 ½ (12-I-40, length: 426 in.)
    - major corrosion of the column at the height of the concrete wall; 10 percent strength reduction is used in analysis
    - paint as shown in Figure D-1.

13. Column P-1 ½ (12-I-25, length: 426 in.)
    - major corrosion of previous repairs, including the base plate angles and bolts at the column's base
    - repair as shown in Figure D-5.

Notes 14 through 24 are related to members with 5 percent strength reduction. All members have a large margin of safety. Thus, paint as recommended in Figure D-1.

14. Column N-2 (18-I-46, length: 554 in.)
    - minor corrosion of the base plate and the column flange at its base; 5 percent strength reduction will be used in analysis
    - capacity-demand ratio is less than 0.5.

15. Column P-5 ½ (12-I-25, length: 426 in.)
    - minor corrosion; approximate strength reduction is 5 percent.

16. Column D-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is 0.576.

17. Column G-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is 0.576.

18. Column H-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is 0.576.

19. Column J-2 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is 0.576.

20. Column A-4 (18-I-64, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is less than 0.5.

21. Column B-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is less than 0.5.

22. Column D-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio less than 0.5.

23. Column K-4 (18-I-85, length: 554 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is less than 0.5.

24 Column A-5 (18-I-47, length: 426 in.)
    - minor corrosion at the column base; approximate strength reduction is 5 percent
    - capacity-demand ratio is less than 0.5.

Notes 25 and 26 are general comments to protect the structural members in the hangar.

25. A number of radiant heaters along both T2 trusses and SF frames are welded to the diagonal bracing members. The welding process seems to have had an effect on these members. There are visible heat effects on the side of the

member opposite the weld. Noted especially on member T1-K 16/V (double angle 6 x 3½ x 5/16 x 190 in.). Isolate these structural members from the heaters.

26. Care should be taken to prevent rainwater from entering and collecting in the door pockets, as this water can damage the columns. Standing water was present in the door drains.

8 Retrofit Schemes for Members Failed in Analysis

Appendix E shows schematic diagrams of the trusses with proposed retrofits, and includes the element-numbering and joint-numbering schemes. General notes about the proposed retrofits and detailed technical drawings can be found in Appendix F.

Retrofit of T1 Truss

Knee braces were added to the truss models for both the maximum and weighted average wind load conditions in all four hangars. The knee braces were double angles 8 x 8 x ½ made of A-36 steel. They were placed under the first and last bays of the truss. They extend from the first panel point of the truss' bottom chord at about a 30 degree angle to connect to the column 95 in. below the level of the bottom chord. These knee braces were investigated for all four hangars. Details for the knee braces are shown in Figure F-2 for Hangars 43 and 47 and Figure F-3 for Hangars 44 and 45. Figures E-1 and E-2 show the element-numbering system and location of knee braces. Figures E-6 and E-7 show the joint-numbering system. Input and output files for SAP90 can be found in Appendix G.

Retrofit of T2 Truss

Knee braces were added to the truss models for all four hangars. The knee braces used were double angles 8 x 8 x ½ made of A-36 steel. Four knee braces were used, two at the outer ends of the truss and two in the middle bays. The outer two were placed under the first and last bays from the panel points of the bottom chord down on a 30 degree angle to the outer columns 95 in. below the height of the bottom chord. The middle two braces were placed under bays 12 and 13 from the panel points of the bottom chord to the center column, connecting at 95 in. below the height of the bottom chord. Details for the knee braces are shown in Figures F-4 and F-5 for Hangars 43 and 47 and Figure F-5 for Hangars 44 and 45. Figures E-3 and E-4 show the element-numbering

system and location of knee braces. Figures E-8 and E-9 show the joint-numbering system. Input and output files for SAP90 can be found in Appendix G.

Retrofit of T3 Truss

Four knee braces were added to the truss models for all four hangars. The knee braces used were double angles 8 x 8 x ½ of A-36 steel. Four knee braces were used, two at the outer bays and two at the center bays. The outer two extended from the first unsupported panel points of the bottom chord to the column 108 in. below the level of the bottom chord. The middle knee braces extended from the first unsupported panel points of the bottom chord to the center column, 108 in. below the height of the bottom chord.

The outer two knee braces were found to overstress the column to which they were connected. The trusses of all four hangars were modeled with only the middle knee braces, which are supported by the center column. Details for the knee braces used in analysis are shown in Figure F-6 for Hangars 43, 44, and 45. Figure E-5 shows the element-numbering system and location of knee braces. Figure E-10 shows the joint-numbering system. Input and output files for SAP90 can be found in Appendix G.

Further retrofit of members #7417 and #7420 was necessary in Hangars 43, 44, and 45, as shown in Chapter 9. The retrofit schemes for these members are shown in Figure F-7. Two half-inch plates are to be welded to the flanges of the section using tabs and 5/16 in. fillet welds. Adding these plates will greatly increase the bending strength of the member about the I-section's weak axis. The plates will also increase the area of the section by 187 percent and stabilize the flange from local buckling. Both effects will increase the compressive strength of the section as well. This will have the effect of making the members structurally sound for the loads used in analysis.

Truss T3 of Hangar 47 has been modified to carry the larger-capacity crane that was installed. The members #7420 and #7417 were modified with the addition of two half-inch plates for each member. Also, columns were added to support the spans of the truss. These modifications can be seen in ijo drawing number 5-5712. Therefore, the retrofit schemes for members #7417 and #7420 do not apply for Hangar 47. The addition of knee braces is unnecessary for truss T3 in Hangar 47.

9 Structural Analysis of Members and Connections After Retrofit

The addition of knee braces as described below for all trusses is recommended to reduce stress on truss members and connections, except for the T3 truss in Hangar 47 as discussed later. There may be difficulty in the construction of the knee braces in certain areas of the structure not foreseen in this report. For trusses not in need of knee braces as determined by this report, it is left to the client to decide whether it is worth the cost of construction.

Analysis of T1 Truss With Knee Braces

Note that the T1 truss in Hangars 43 and 47 is symmetric and any stress on a member can also be applied to its mirror image about the centerline. However, the T1 truss in Hangars 44 and 45 is not symmetric, and only the stresses shown apply to any given member. The weighted-average wind pressure shall be considered the more accurate wind loading. The maximum wind loading condition is considered for comparison. Decisions for retrofit are based on the weighted-average wind loading.

When using the maximum wind load as discussed earlier, 31 members of the T1 truss in Hangars 43 and 47 had interaction stress ratios greater than 1.0 in tension. None of these ratios remained above one after the factors of safety were removed. In compression, 54 members were overstressed. After the factors of safety were removed 18 members remained overstressed. All these members are main diagonal members of the truss. Results are taken from Tables 9.1 and 9.2.

When the weighted-average wind load was used for the T1 truss in Hangars 43 and 47, no members were overstressed in tension before or after the factors of safety were removed. In compression, 30 members were overstressed with none remaining so after the factors of safety were removed. Results are taken from Tables 9.3 and 9.4.

When using the maximum design wind pressure on the T1 truss in Hangars 44 and 45, 38 members had interaction stress ratios greater than 1.0 in tension. After the factors of safety were removed none of these members remained

overstressed. In compression, 65 members were overstressed with 17 members remaining overstressed after the factors of safety were removed. Sixteen of these members are main diagonals of the truss. The other is an outside column of the bracing bay. Results are taken from Tables 9.5 and 9.6.

When the weighted-average of the wind pressures was used on the T1 truss in Hangars 44 and 45, 10 members had interaction stress ratios greater than 1.0 in tension. After the factors of safety were removed, none of the members retained a stress ratio greater than 1.0. In compression, 36 members were overstressed. Member #867 was the only one to be overstressed without the factors of safety with a ratio of 1.009. This falls below the 5 percent rule of thumb and the member should be considered safe. Member #867 is a first floor outside column of the bracing bay and is supported by the outside wall. Results are taken from Tables 9.7 and 9.8.

Analysis of T2 Truss With Knee Braces

Note that the T2 truss in Hangars 43 and 47 is symmetric and stresses on a member also apply to its mirror image about the centerline. However, the T2 truss in Hangars 44 and 45 is not symmetric and the stresses shown are the only ones that apply to any given member.

No members of the T2 truss in Hangars 43 and 47 had an interaction stress ratio greater than 0.5 in tension. In compression, 18 members were overstressed. None of these remained overstressed after the factors of safety were removed. Results are taken from Tables 9.9 and 9.10.

No members of the T2 truss in Hangars 44 and 45 had interaction stress ratios greater than 0.5 in tension. In compression, 15 members were overstressed with none remaining after the factors of safety were removed. Results are taken from Tables 9.11 and 9.12.

Analysis of T3 Truss With Middle Knee Braces

Note that the T3 truss was analyzed with four knee braces but the outer braces overstressed the supporting column and the configuration with only middle knee braces was adopted. Also note that all T3 trusses are symmetric and stresses on one member can be applied to its mirror image about the centerline. The uniform distribution of the weighted-average wind pressure shall be considered the more accurate wind loading. The stepped wind loading condition is

considered for comparison. Decisions for retrofit are based on the uniform, weighted-average wind loading.

When the stepped wind distribution was used on the T3 truss in Hangars 43 and 47, 5 members had interaction stress ratios greater than 1.0 in tension, none of which remained overstressed after the factors of safety were removed. In compression, 16 members were overstressed. Three members remained overstressed after the factors of safety were removed, #7411, #7417, and #7420 with ratios 1.025, 1.533, and 1.516, respectively. All three members are diagonals of the truss. Member #7411 can be considered safe because the stress ratio falls below the 5 percent rule of thumb. Results are taken from Tables 9.13 and 9.14.

When the uniform distribution of the weighted-average of the wind pressures was used, 2 members had interaction stress ratios greater than 1.0 in tension with the factors of safety and none were overstressed without the factors of safety. In compression, 15 members were overstressed. Two remained overstressed with the factors of safety removed. They are both diagonals of the truss. These members are #7417 and #7420 with ratios 1.137 for both. Using retrofit schemes from Chapter 8 will increase the section 187 percent as well as increase the bending strength. These improvements will easily make the member structurally sound. Results are taken from Tables 9.15 and 9.16.

The T3 truss in Hangar 47 has been modified to carry the larger capacity crane that was installed. Members #7420 and #7417 were modified with the addition of two half-inch plates for each member. Also, columns were added to support the spans of the truss. These modifications can be seen in ijo drawing number 5-5712. Therefore, the retrofit schemes for members #7417 and #7420 do not apply for Hangar 47. The addition of knee braces is not recommended for the T3 truss in Hangar 47.

When the stepped wind distribution was used on the T3 truss in Hangars 44 and 45, 9 had interaction stress ratios greater than 1.0 in tension. No members were overstressed after the factors of safety were removed. In compression, 17 members were overstressed before the factors of safety were removed and 3 were overstressed after. The members are #7411, #7417, and #7420 with ratios of 1.045, 1.370, and 1.341, respectively. All are diagonals of the truss. Member #7411 can be considered safe because the stress is below the 5 percent rule of thumb to account for conservatism. Results are taken from Tables 9.17 and 9.18.

When the uniform distribution of the weighted average of the design wind pressures was used, 2 members had interaction stress ratios greater than 1.0 in

tension with none remaining overstressed after the factors of safety were removed. In compression, 8 members were overstressed with two remaining overstressed after the factors of safety were removed. These two members are #7417 and #7420 with ratios 1.164 for both. Both are main diagonals of the truss. Using retrofit schemes from Chapter 8 will increase the section 187 percent as well as increase the bending strength. These improvements will easily make the member structurally sound. Results are taken from Tables 9.19 and 9.20.

10 Conclusions

To meet the overall objective of this project the technical approach shown in Chapter 1 was used.

Structural analyses were performed for most dominant loading combinations. A significant number of members did not meet the allowable design stresses per AISC ASD code. However, comparing the actual stresses with evaluation allowable stresses reduced the list of failing members significantly. The evaluation allowable stresses are defined as the design allowable stresses with the factors of safety equal to 1.0.

The use of knee braces in trusses to enhance the structural performance is common practice in new structures. The effects of retrofit of the trusses by adding knee braces was examined and presented. It was found that the addition of knee braces will reduce the stresses in all overstressed members and will increase the stresses in the columns with a significant margin of safety. Thus, retrofit of the trusses is highly recommended, except for truss T3 in Hangar 47, as shown in Chapter 8 and Appendix E. The addition of knee braces was found to be necessary for the T1 truss in Hangars 44 and 45. The addition of knee braces is optional for all other trusses.

The addition of knee braces has further reduced the list of overstressed members. The only members remaining overstressed are in Hangars 43, 44, and 45; they were 7417 and 7420 of the T3 truss. These members were proposed for retrofit, as shown in Figure F-7.

Due to the lack of structural drawings, checking the structural adequacy of the connections was a challenge. Common types of connections were surveyed during inspection and their approximate sizes and configurations were collected and used in rough calculations. The stress interaction values of joint members and the shear capacity of the riveted bolts were examined for each connection type. Calculations for connection adequacy were made for A307 and A325 steel bolts.

The use of A325 bolts in the calculations led to an engineering judgment that the connections are adequate to resist forces of connected members. The use of A307 steel in the calculations would indicate that the connections are probably

inadequate to resist the forces of the connected members. However, it is believed that the bolts are in fact A325 riveted bolts.

This report is also provided as a case study on the analysis of existing steel hangars vulnerable to wind loads.

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Al-Chaar, Ghassan K., *Non-Ductile Behavior of Reinforced Concrete Frames With Masonry Infill Panels Subjected to In-Plane Loading,* Technical Manuscript 99/018 (U.S. Army Construction Engineering Research Laboratories [USACERL], December 1998).

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Reference for Drawings

Ijo Drawing Number 5–5712, Bridge Crane System Hangar 47 South, CCAD, Foundation Plan, Truss Elevations, Column Footing Details, Spread Footing Details and Section Details, Total 3 Sheets, 12 – 11 – 96.

NAVFAC Drawing Number 1353171, Paint Structural and Miscellaneous Steel in Hangars, Bottom Chord Framing and Location Map, Buildings 43, 44, 45, and 47, 5 – 18 – 72.

NAVFAC Drawing Number 1353173, Paint Structural and Miscellaneous Steel in Hangars, Roof Framing Plan, Monitor and Draft Curtain Details, Buildings 43 and 47, 5 – 18 – 71.

NAVFAC Drawing Number 1353174, Paint Structural and Miscellaneous Steel in Hangars, Framing Elevations, Door Details and Color Key, Buildings 43, 44, 45, and 47, 5 – 18 – 71.

NAVFAC Drawing Number 1353177, Paint Structural and Miscellaneous Steel in Hangars, Truss Elevations and Details, Buildings 43 and 47, 5 – 18 – 71.

NAVFAC Drawing Number 1353176, Paint Structural and Miscellaneous Steel in Hangars, Framing Elevations and Sections, Buildings 43 and 47, 5 – 18 – 71.

NAVFAC Drawing Number 5126095, Provide 5 Ton Bridge Crane Hangar 43, Plans and Notes, 4 – 4 – 86.

NAVFAC Drawing Number 5126096, Provide 5 Ton Bridge Crane Hangar 43, Truss Elevations, Mechanical and Electrical Plans and Details, 4 – 4 – 86.

NAVFAC Drawing Number 147140, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Trusses and Columns, Buildings 43 and 47, 8 – 3 – 40.

NAVFAC Drawing Number 147138, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Bottom Chord and Second Floor Framing, Buildings 43 and 47, 8 – 31 – 40.

NAVFAC Drawing Number 147139, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Roof Framing Plan, Buildings 43 and 47, 8 – 31 – 40.

NAVFAC Drawing Number 147141, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Trusses, Buildings 43 and 47, 8 – 3 – 40.

NAVFAC Drawing Number 147142, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Elevations-Structural, Buildings 43 and 47, 8 – 3 – 40.

NAVFAC Drawing Number 156838, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Bottom Chord and Second Floor Framing Plan, Buildings 44 and 45, 4 – 15 – 41.

NAVFAC Drawing Number 156841, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Trusses, Buildings 44 and 45, 4 – 15 – 41.

NAVFAC Drawing Number 156842, U.S. Naval Air Station Corpus Christi, Texas Seaplane Hangar, Elevations-Structural, Buildings 44 and 45, 4 – 15 – 41.

NAVFAC Drawing Number 1335798, Paint Interior Hangars 44 and 45, 8 – 7 – 69.

NAVFAC Drawing Number 1353364, Paint Interior Hangars 43, 44, and 45, 4 – 7 – 70.

NAVFAC Drawing Number 5078785, Repair of Columns in CCAD Door Pockets, 7 – 9 – 82.

NAVFAC Drawing Number 5078784, Repair of Columns in CCAD Door Pockets, 7 – 9 – 82.

NAVFAC Drawing Number 5288902, Exterior Repairs to Hangar 43, CCAD NS Corpus Christi, Texas, Elevations East/West, 8 – 4 – 95.

Figures and Tables Cited in Text

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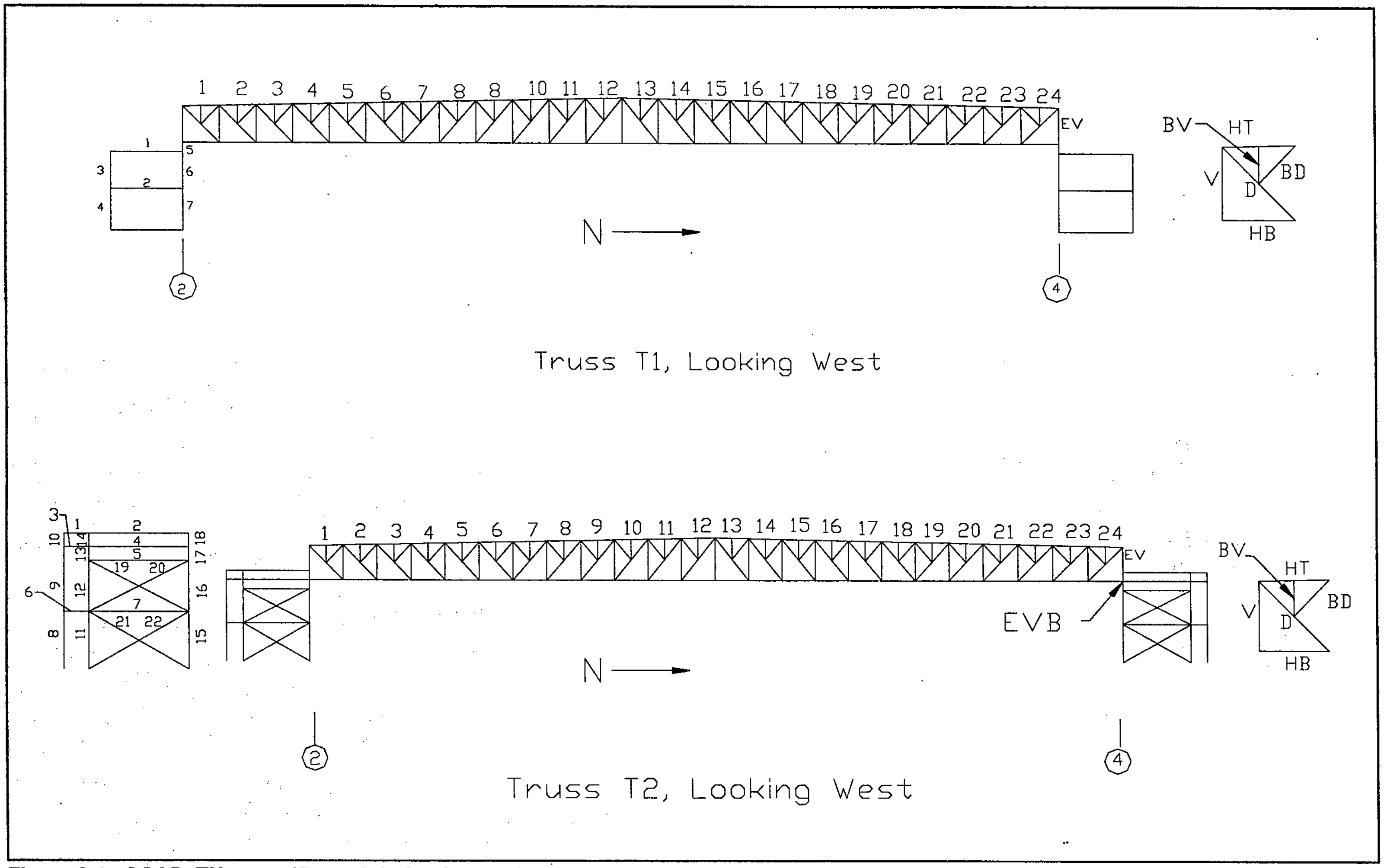

Figure 2.1. CCAD, TX, truss ID used during inspection.

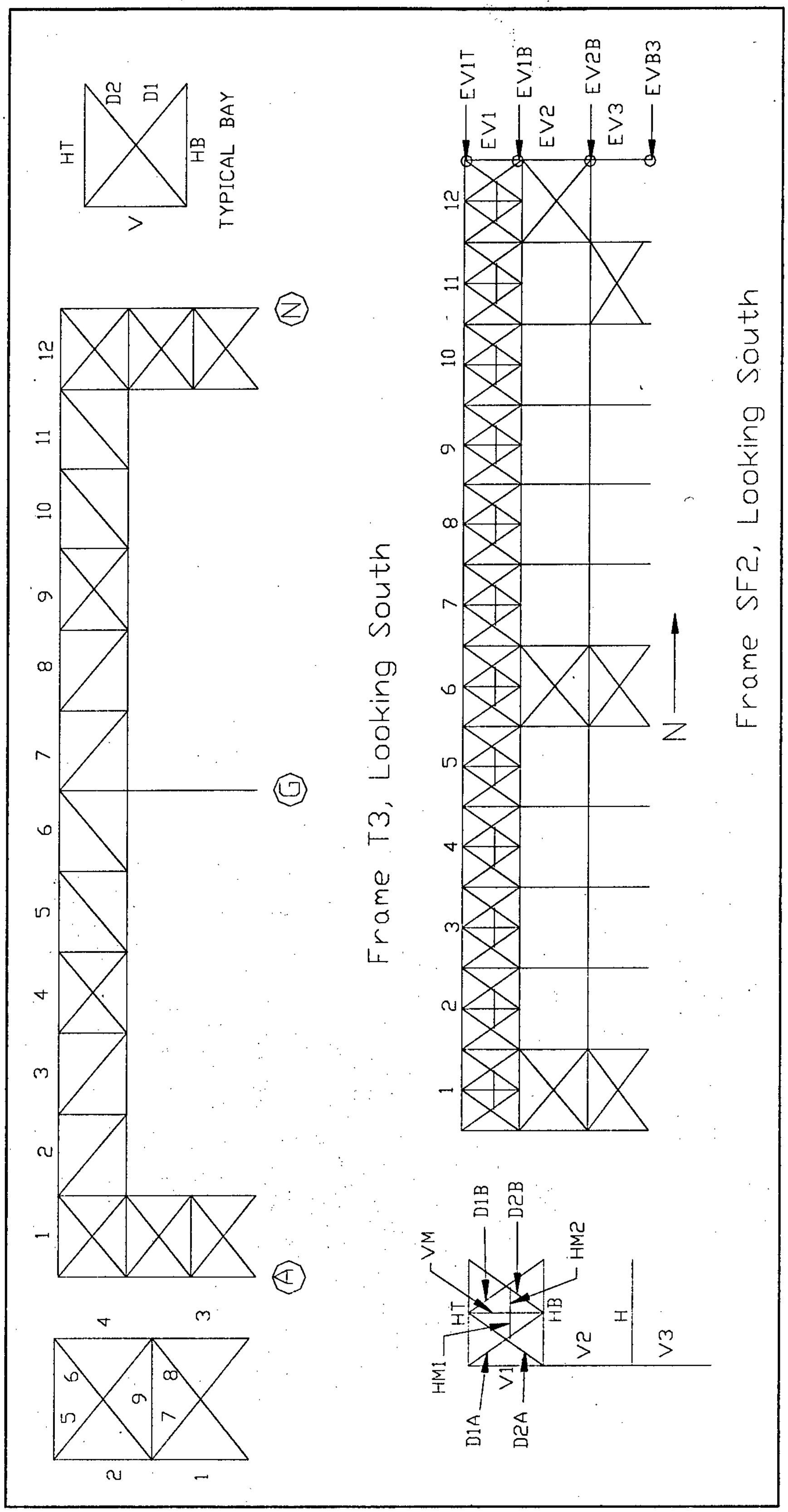

Figure 2.2. CCAD, TX, truss ID used during inspection.

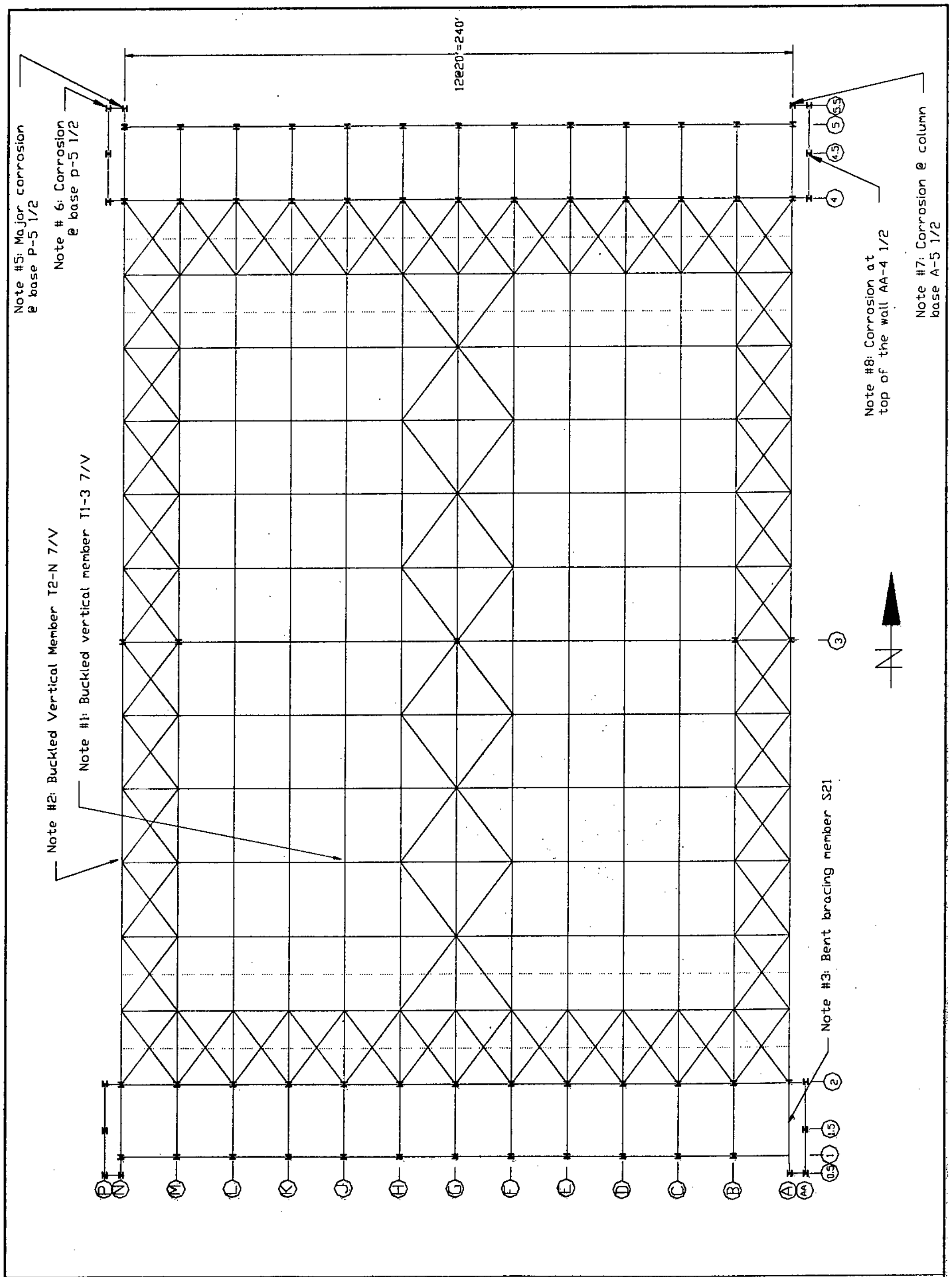

Figure 2.3. CCAD, TX, Hangar 43, location of deficiencies.

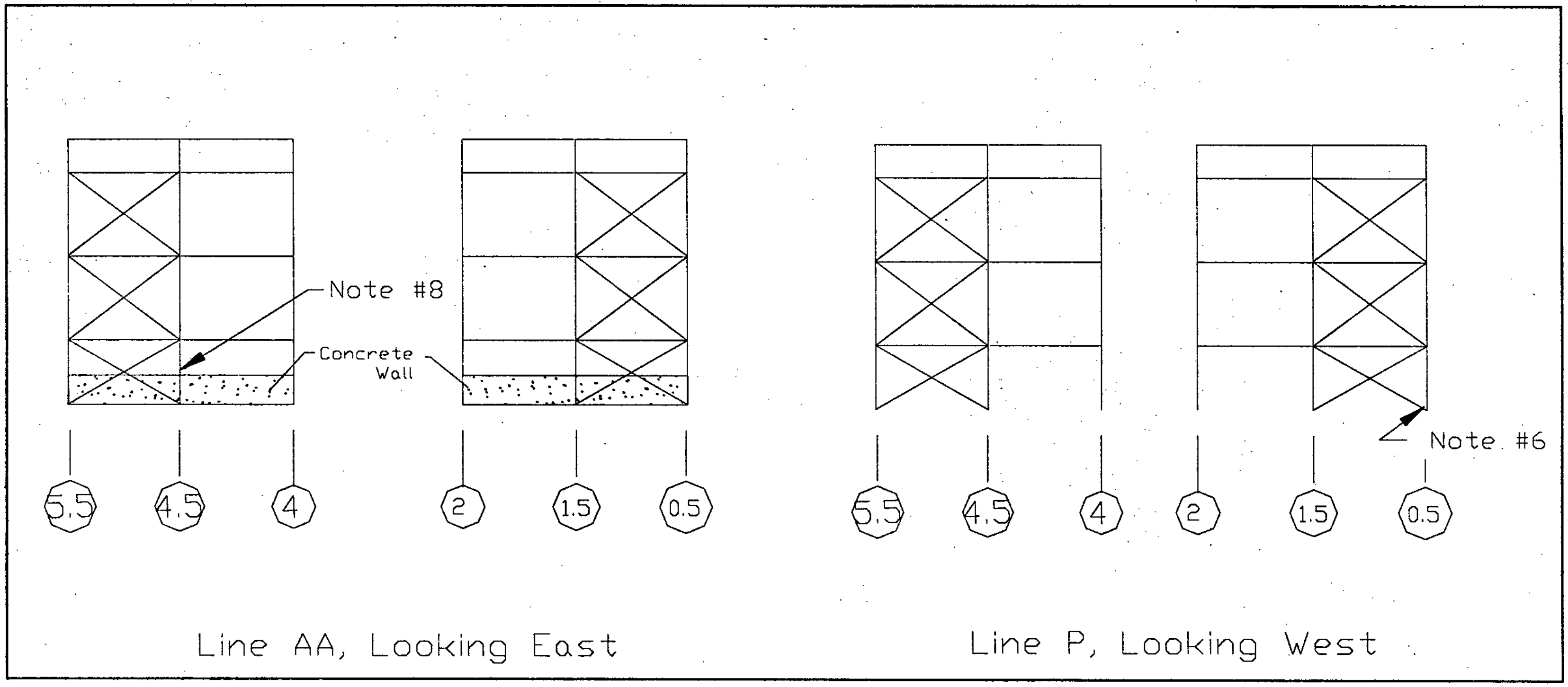

Figure 2.4. CCAD, TX, Hangar 43, door pocket deficiencies.

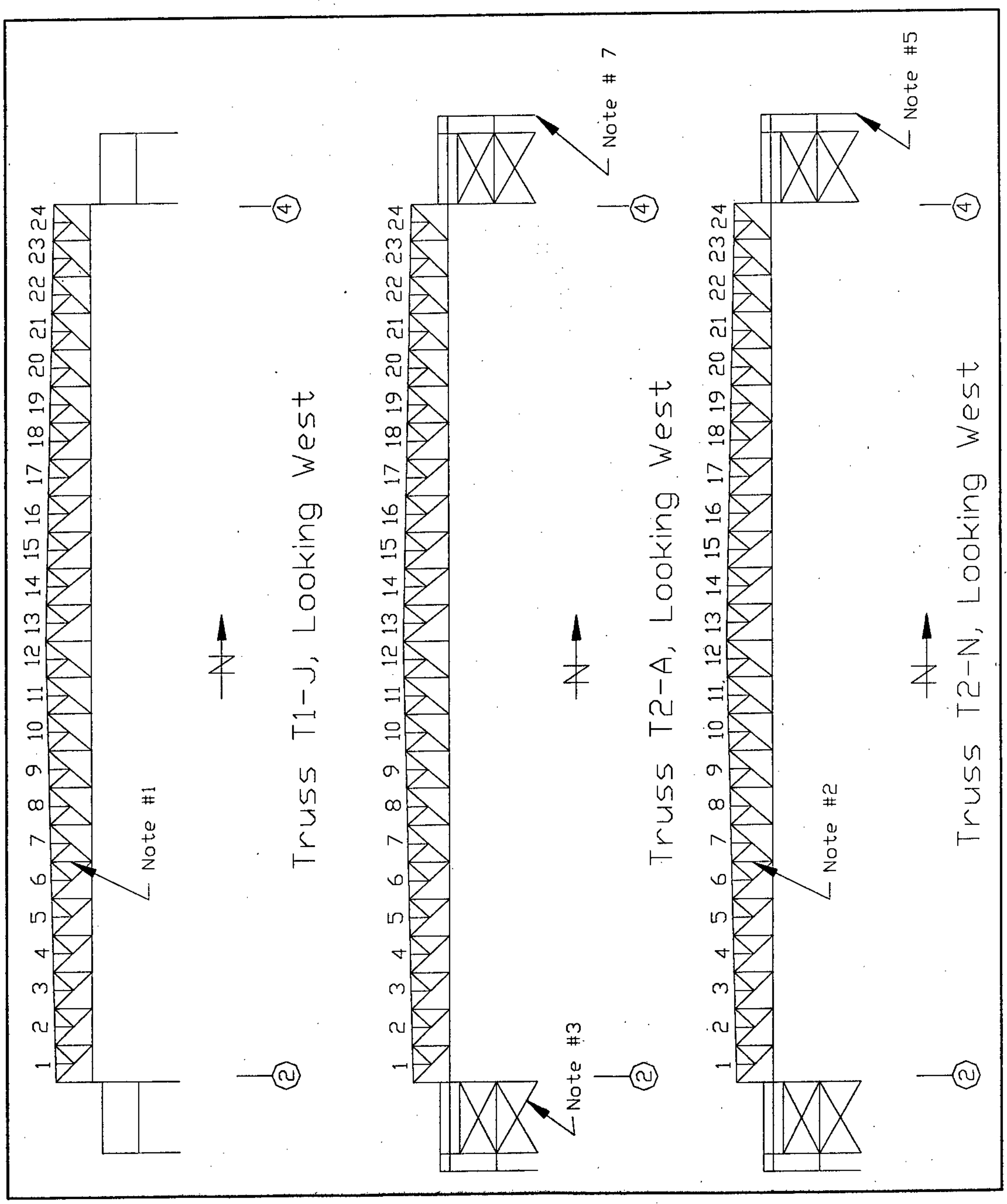

Figure 2.5. CCAD, TX, Hangar 43, location of deficiencies (elevation).

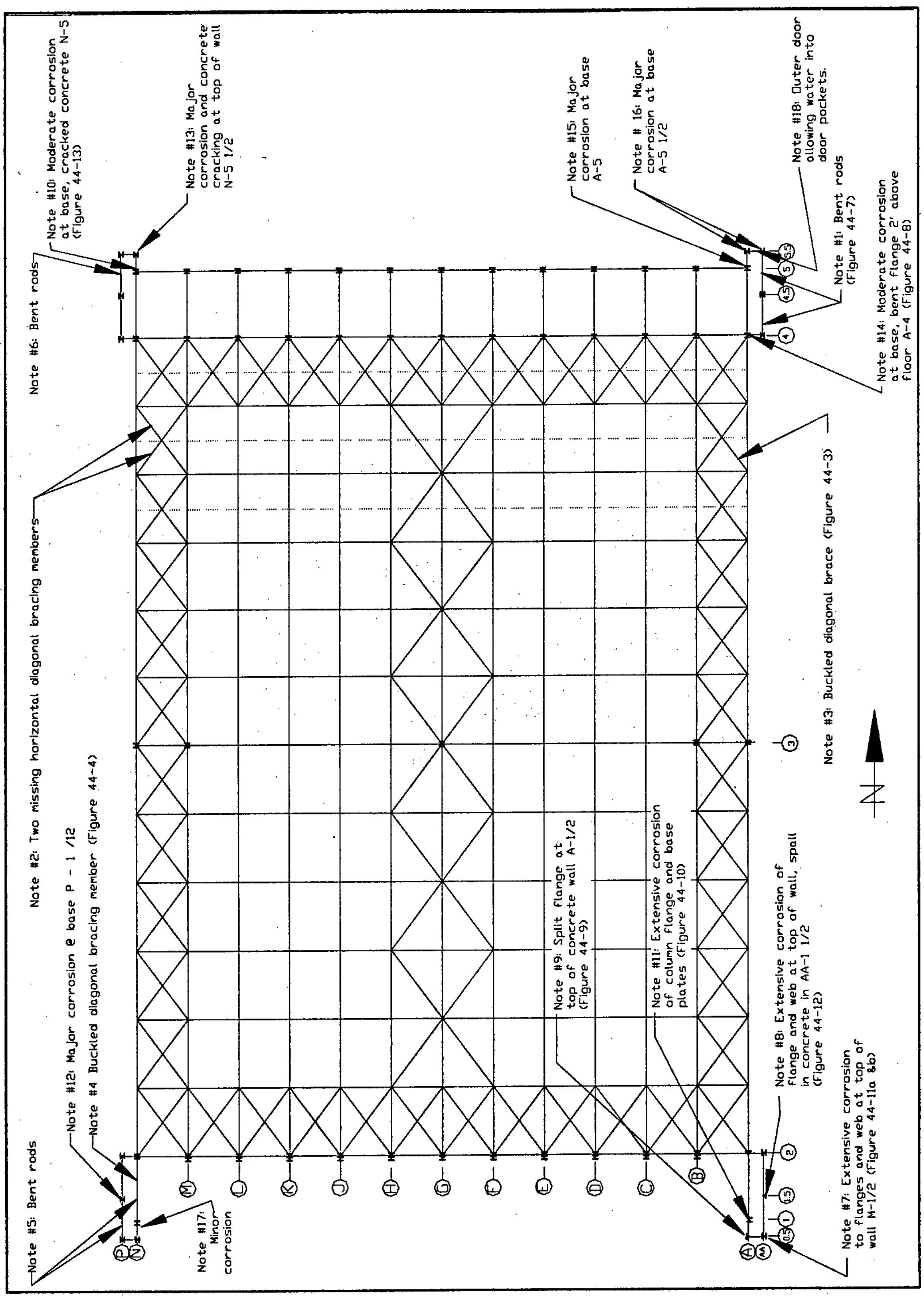

Figure 2.6. CCAD, TX, Hangar 44, location of deficiencies (plan).

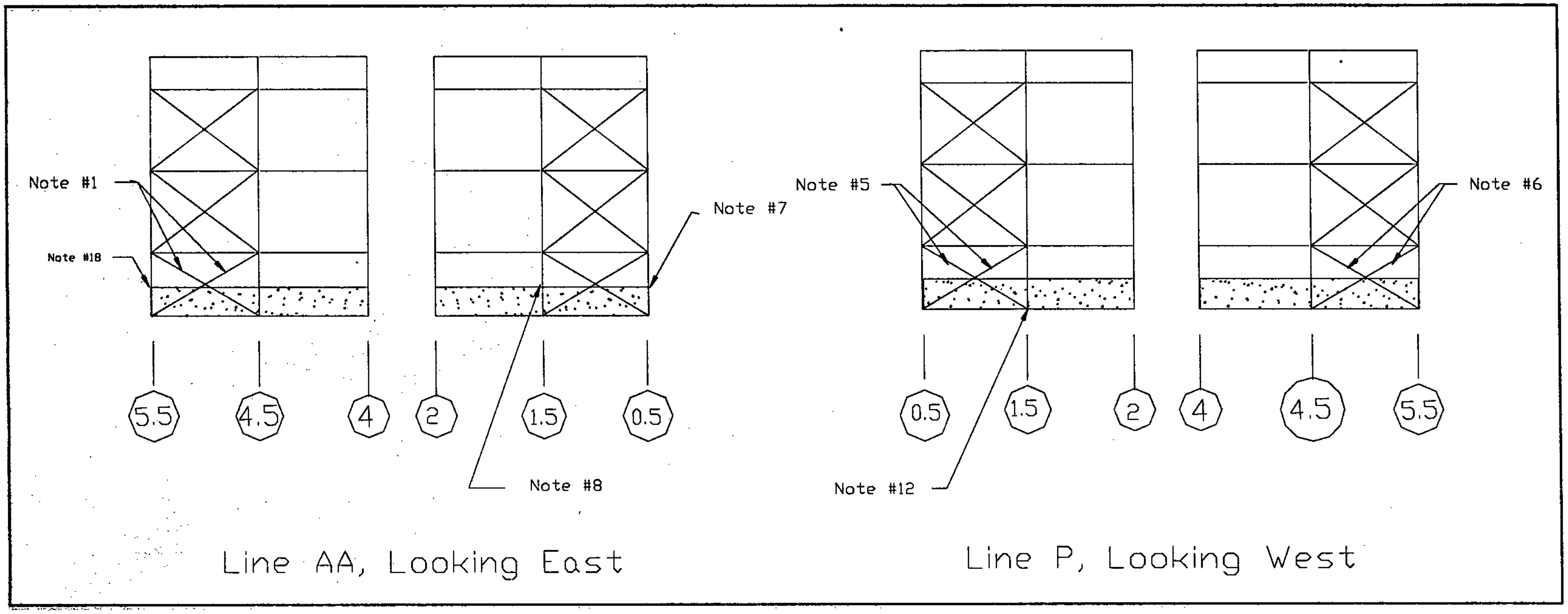

Figure 2.7. CCAD, TX, Hangar 44, door pocket deficiencies.

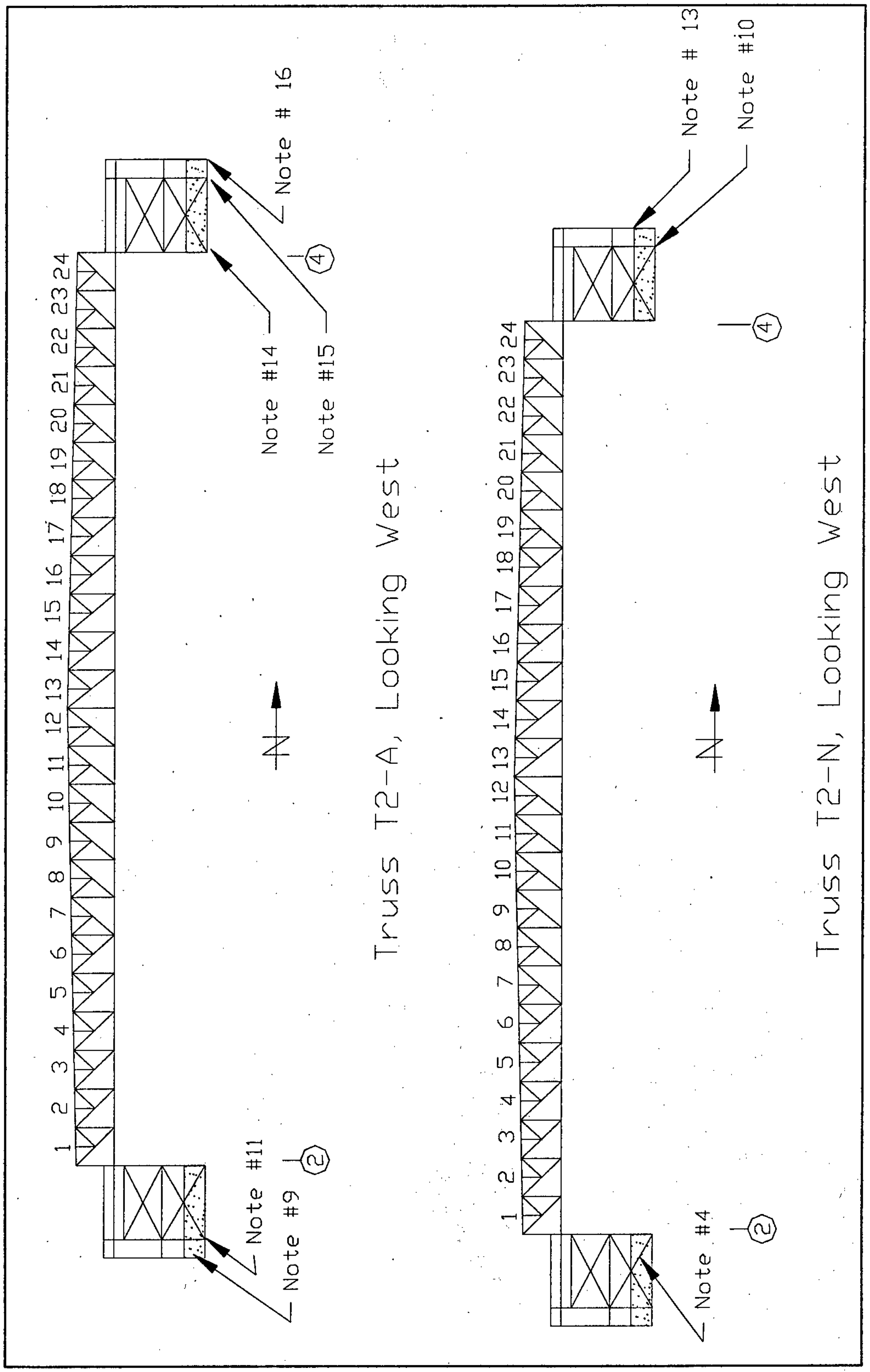

Figure 2.8. CCAD, TX, Hangar 44, location of deficiencies (elevation).

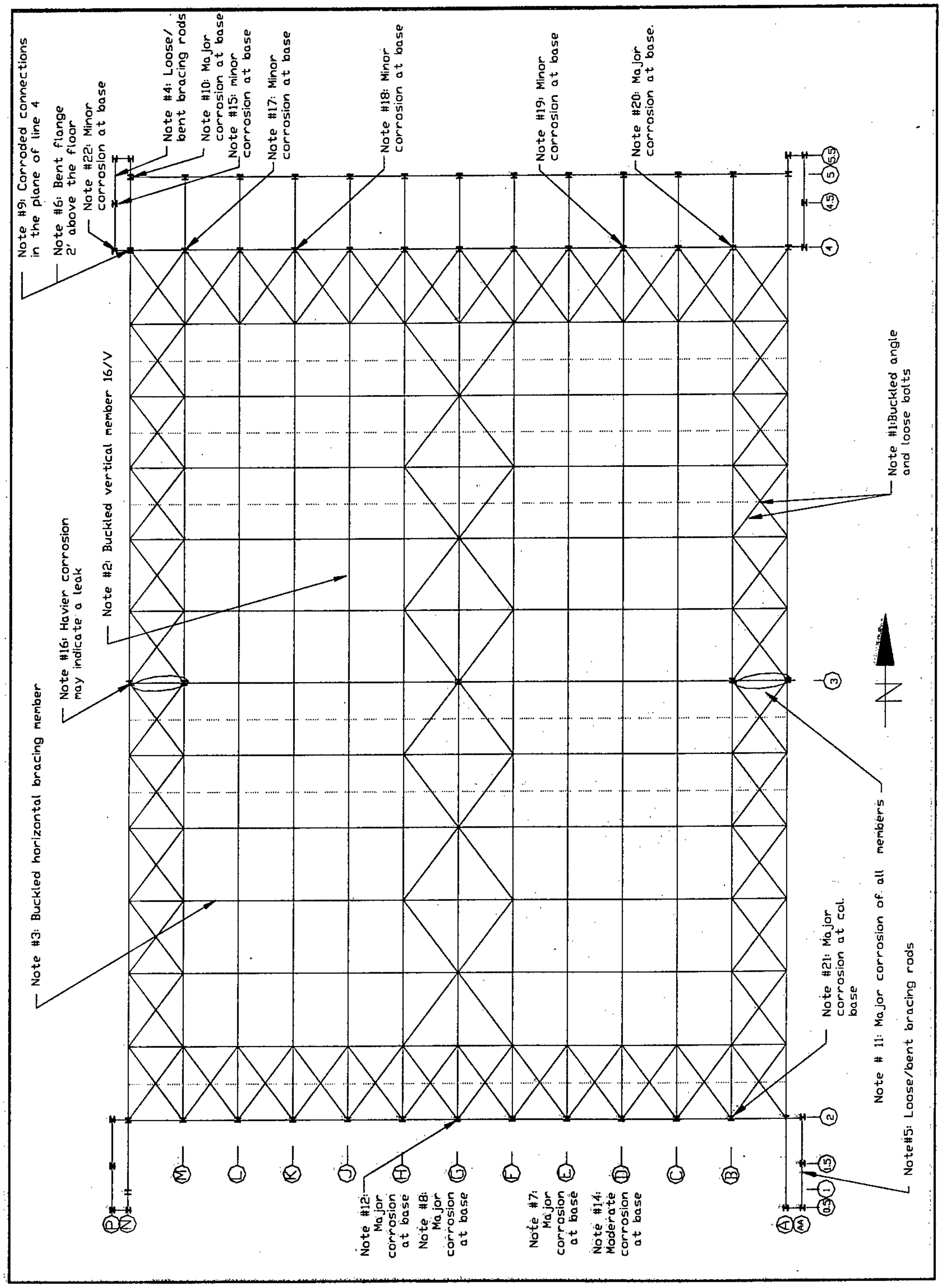

Figure 2.9. CCAD, TX, Hangar 45, location of deficiencies (plan).

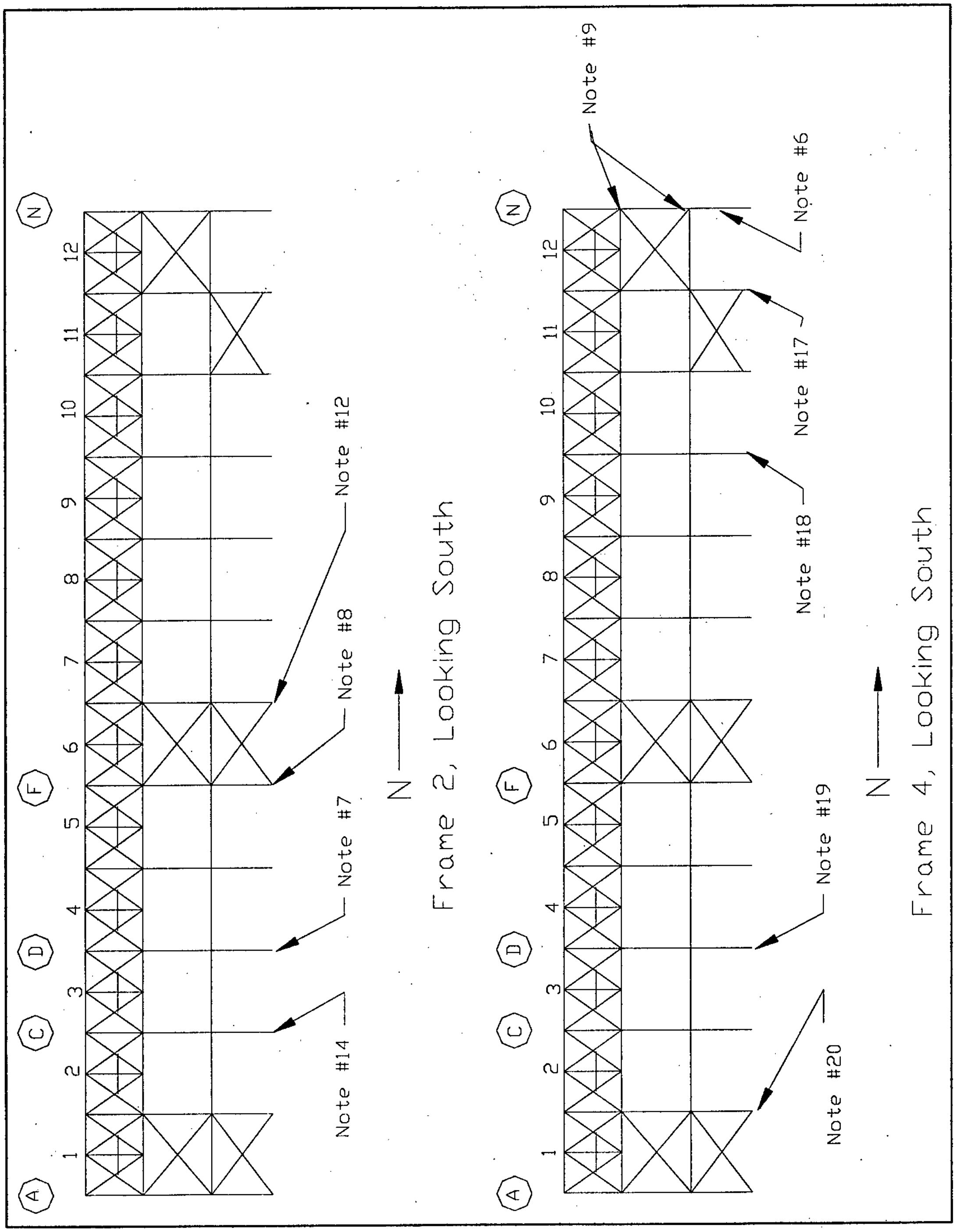

Figure 2.10. CCAD, TX, Hangar 45, location of deficiencies (elevation).

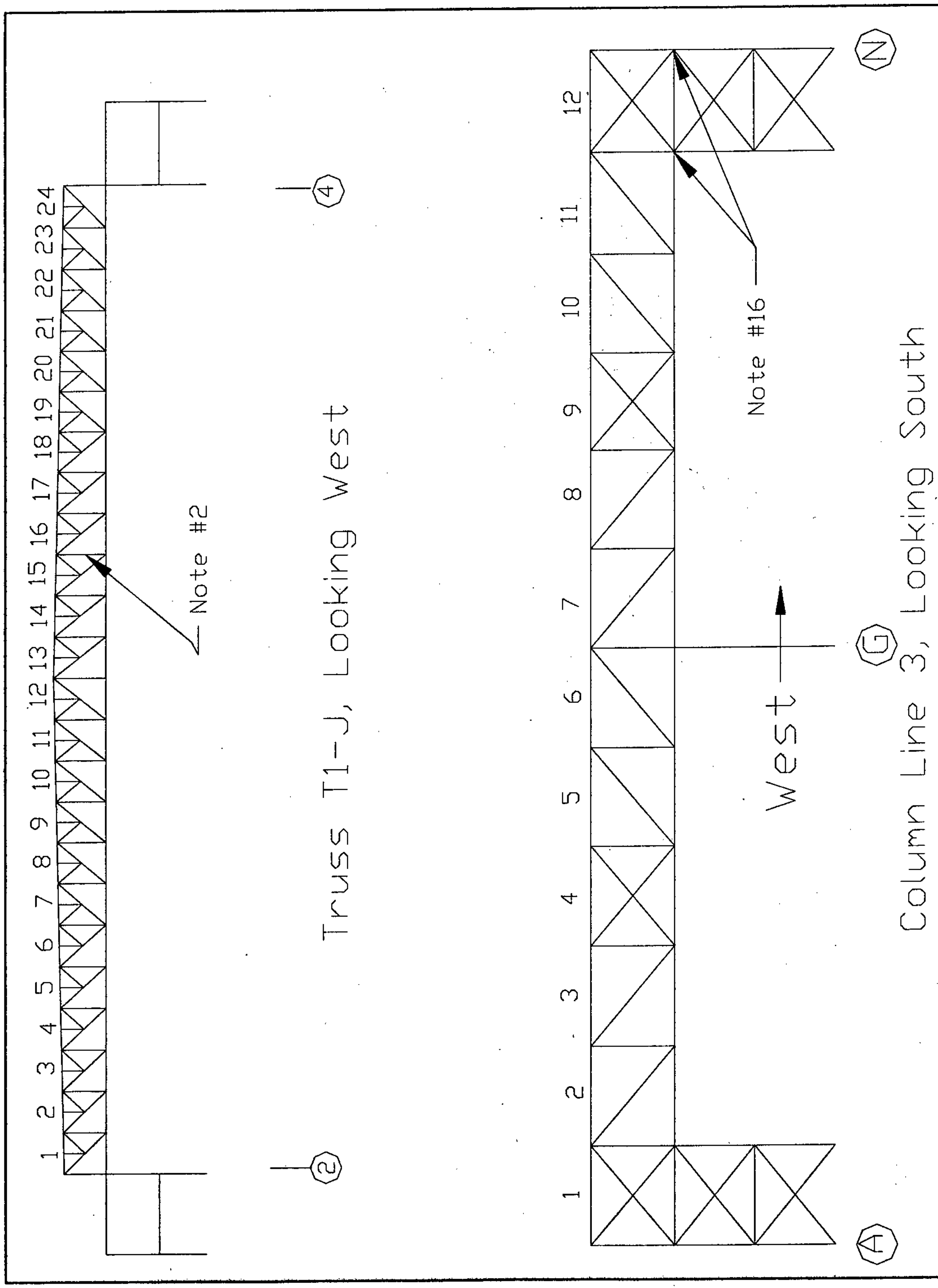

Figure 2.11. CCAD, TX, Hangar 45, location of deficiencies (elevation).

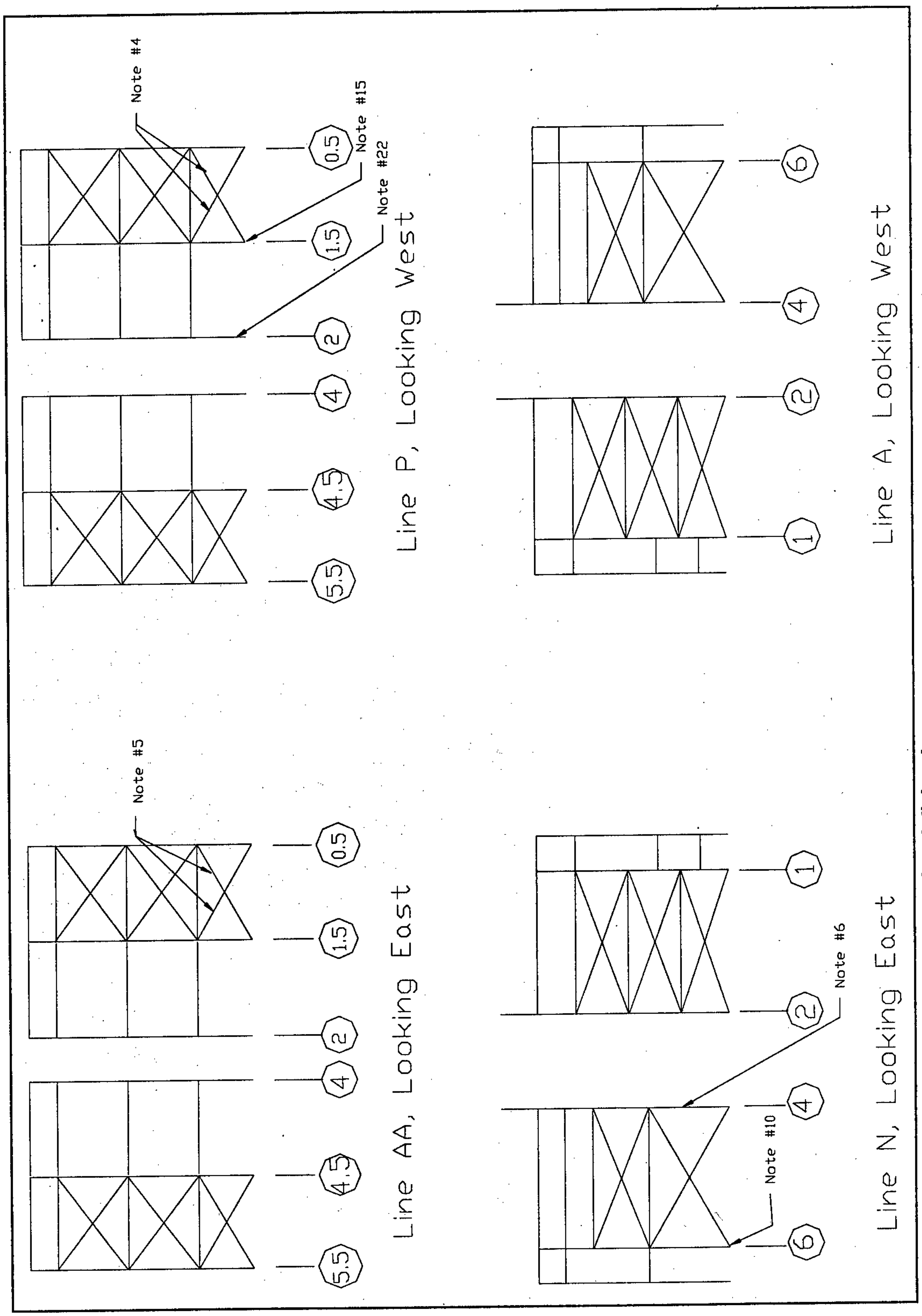

Figure 2.12. CCAD, TX, Hangar 45, door pocket deficiencies.

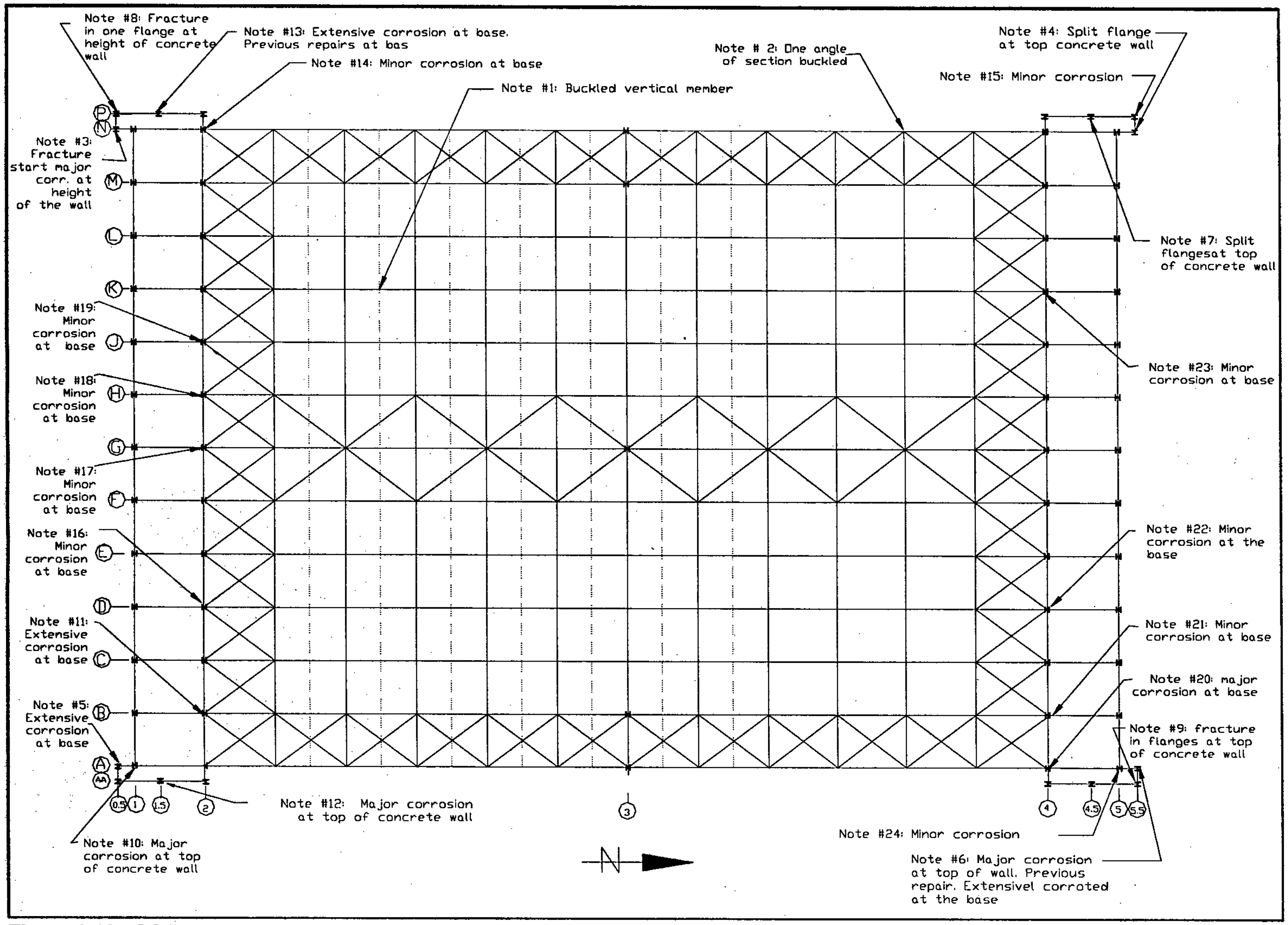

Figure 2.13. CCAD, TX, Hangar 47, location of deficiencies (plan).

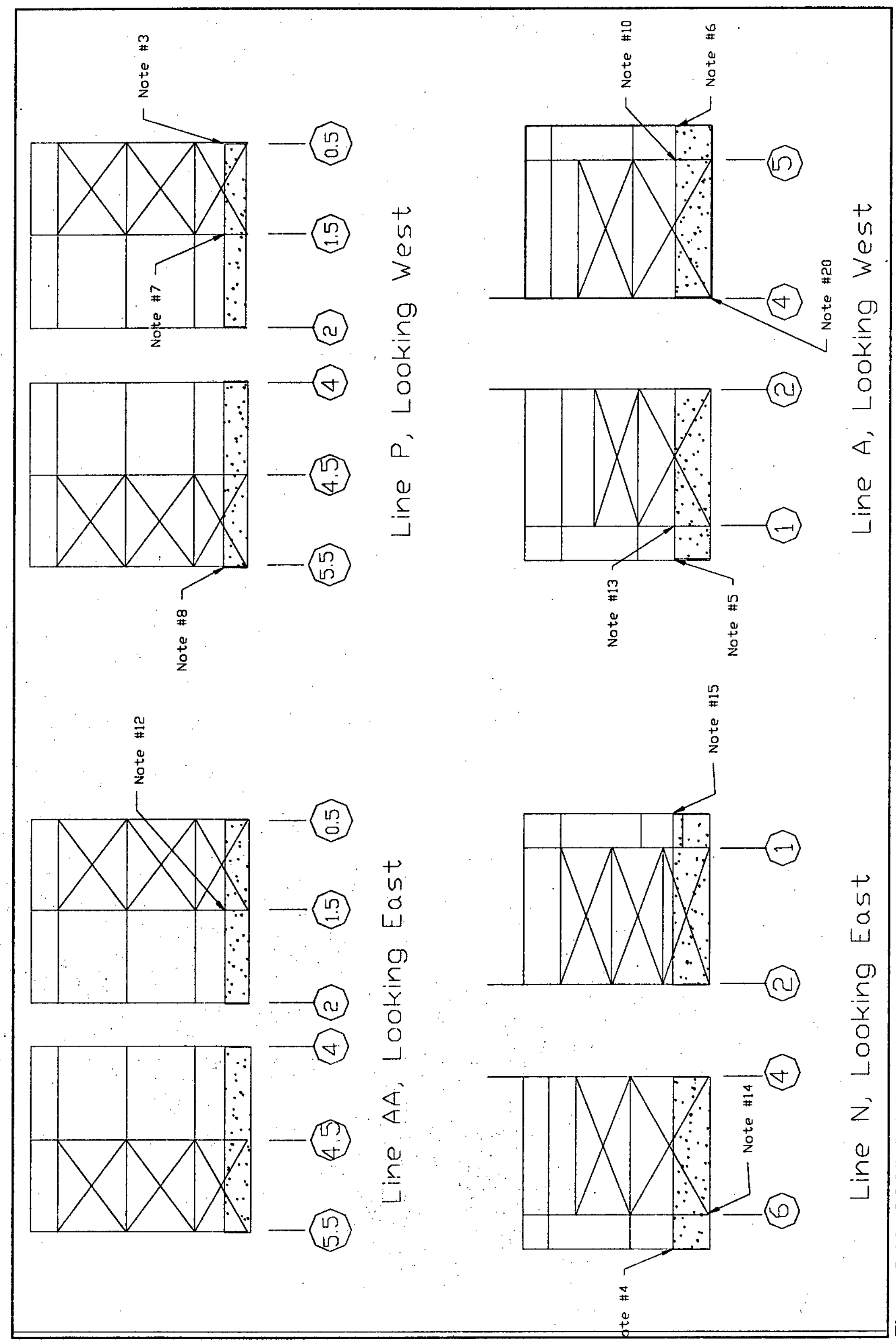

Figure 2.14. CCAD, TX, Hangar 47, door pocket deficiencies.

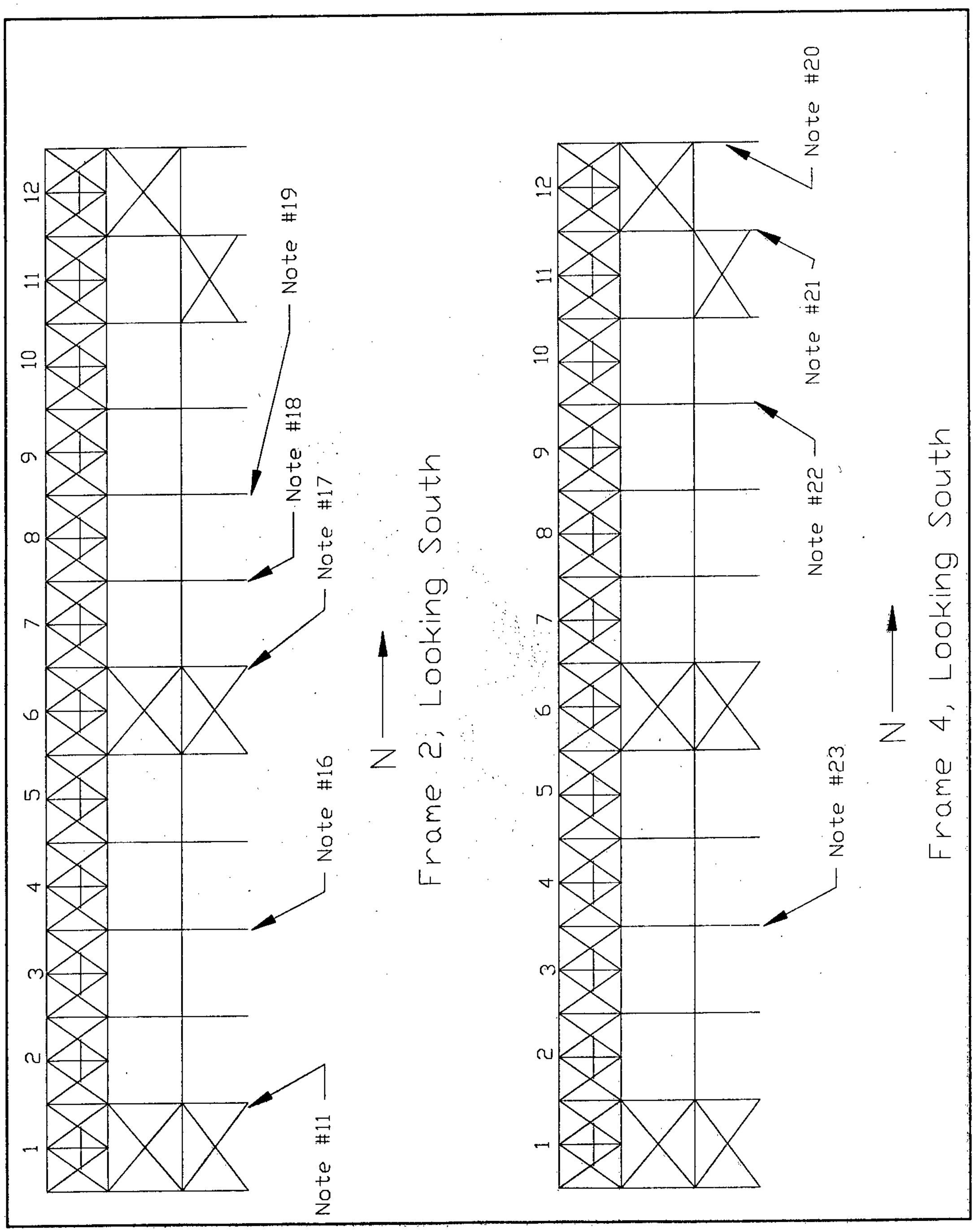

Figure 2.15. CCAD, TX, Hangar 47, location of deficiencies.

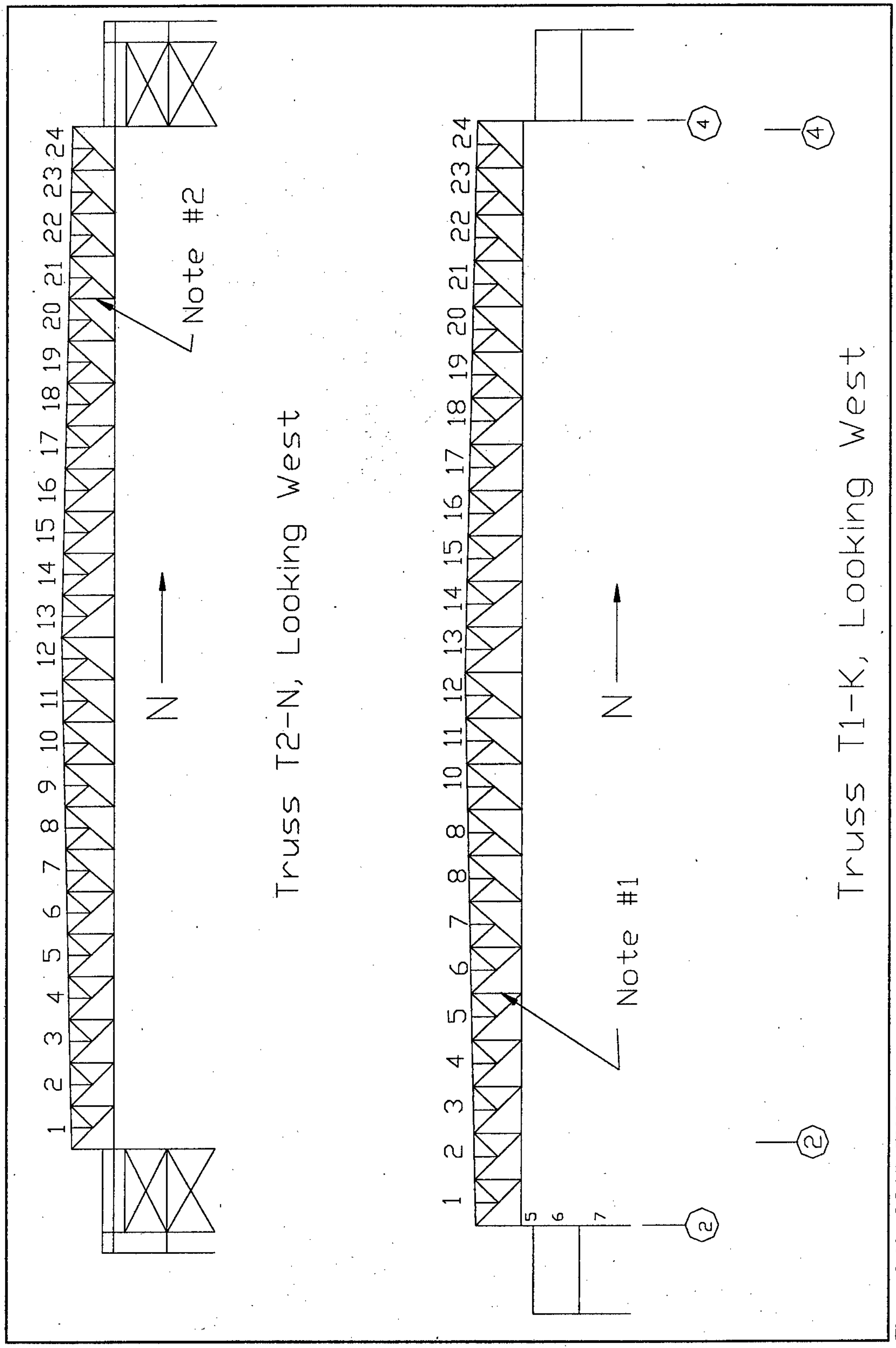

Figure 2.16. CCAD, TX, Hangar 47, location of deficiencies.

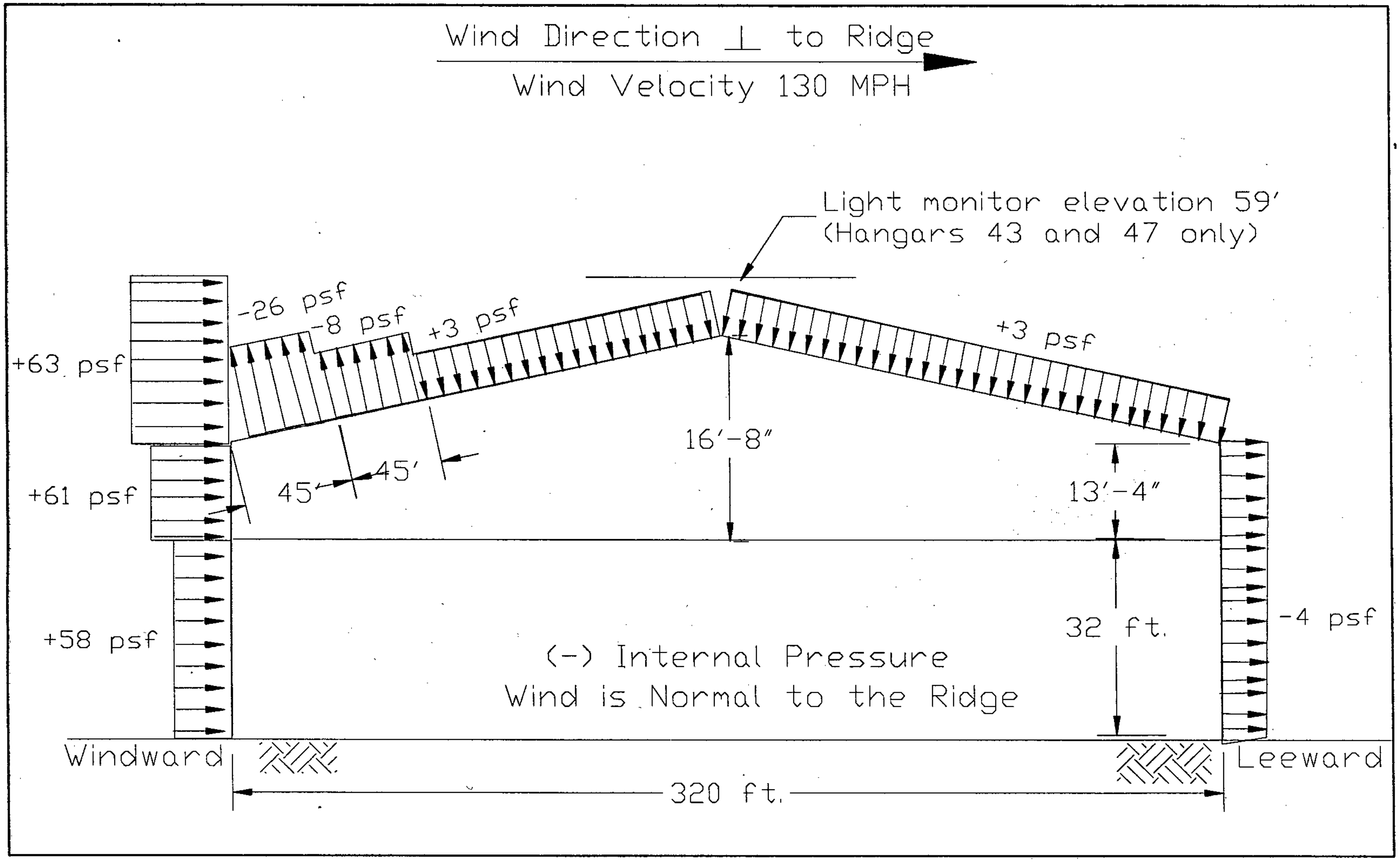

Figure 3.1. CCAD, TX, wind pressure distribution for all hangars (wind I).

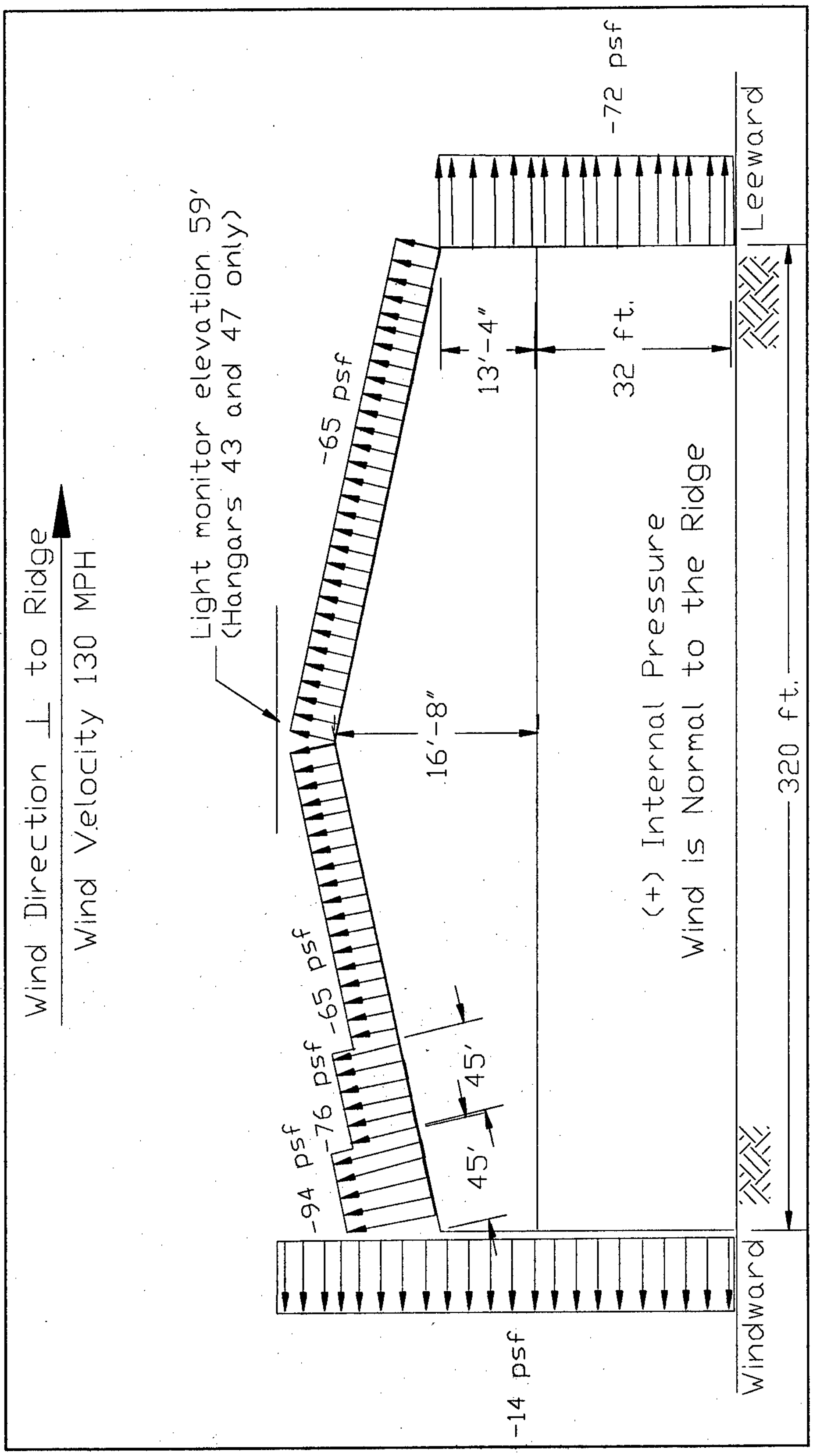

Figure 3.2. CCAD, TX, wind pressure distribution for all hangars (wind II).

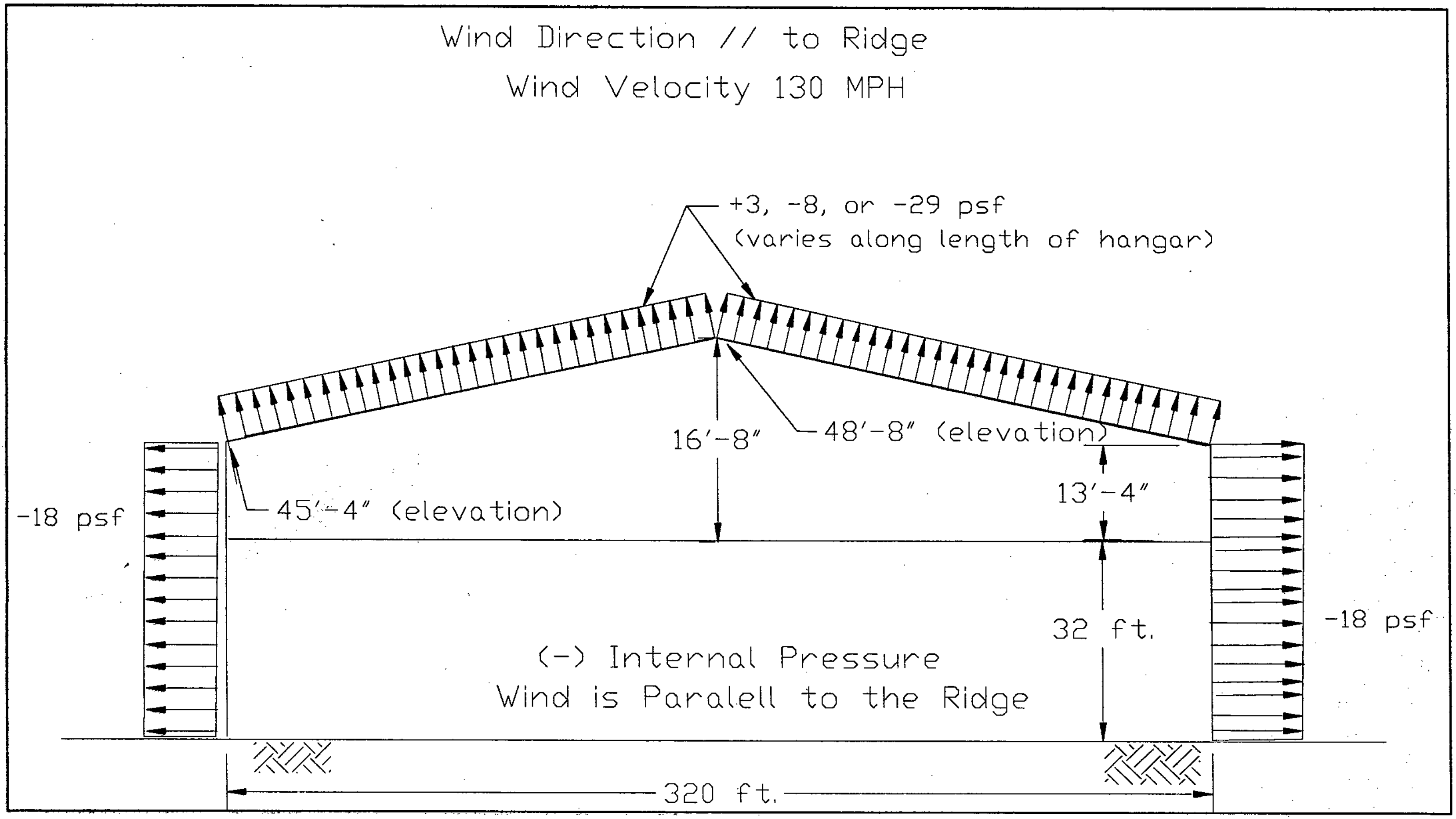

Figure 3.3. CCAD, TX, wind pressure distribution for all hangars (wind III).

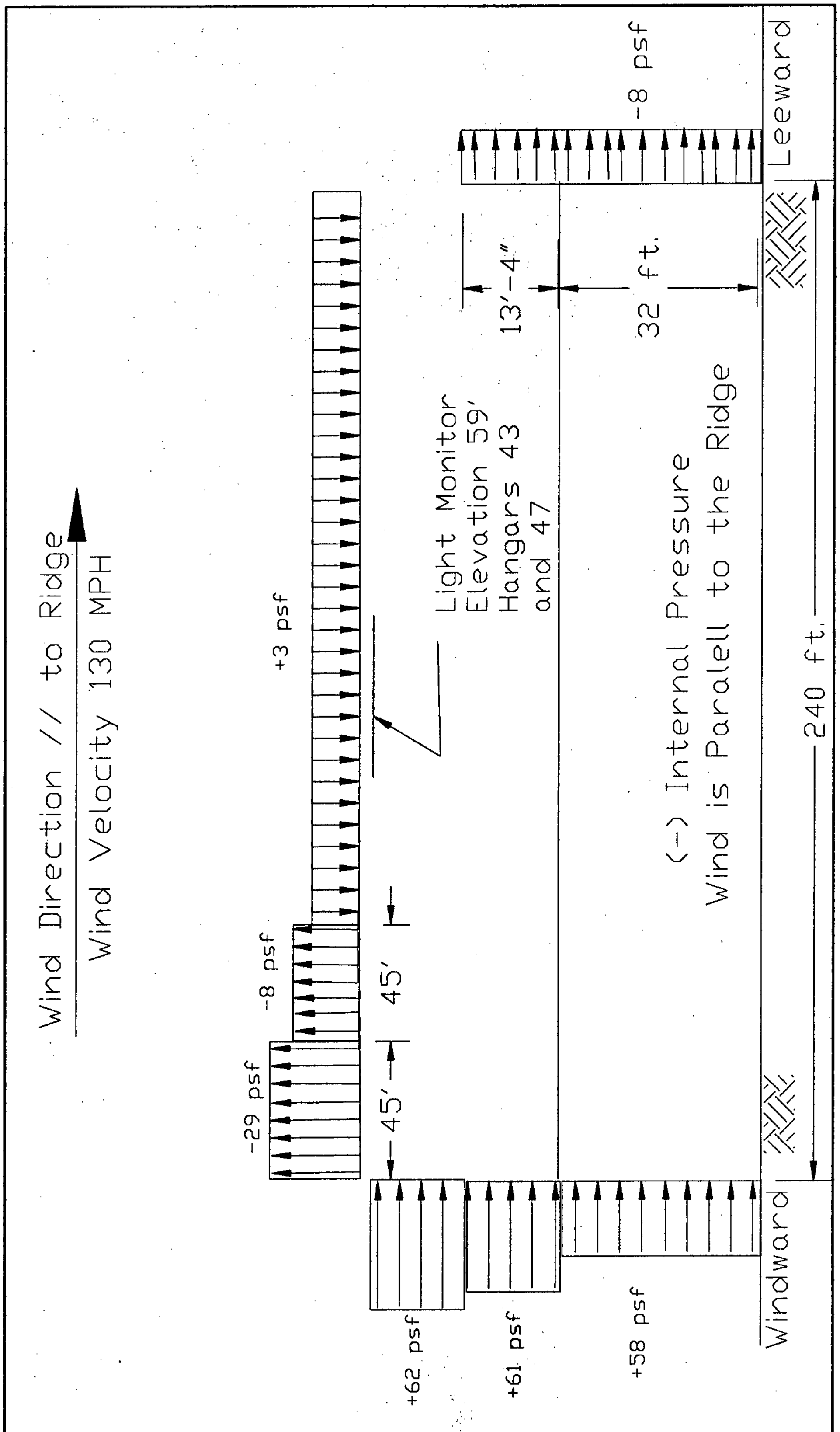

Figure 3.4. CCAD, TX, wind pressure distribution for all hangars (wind IV).

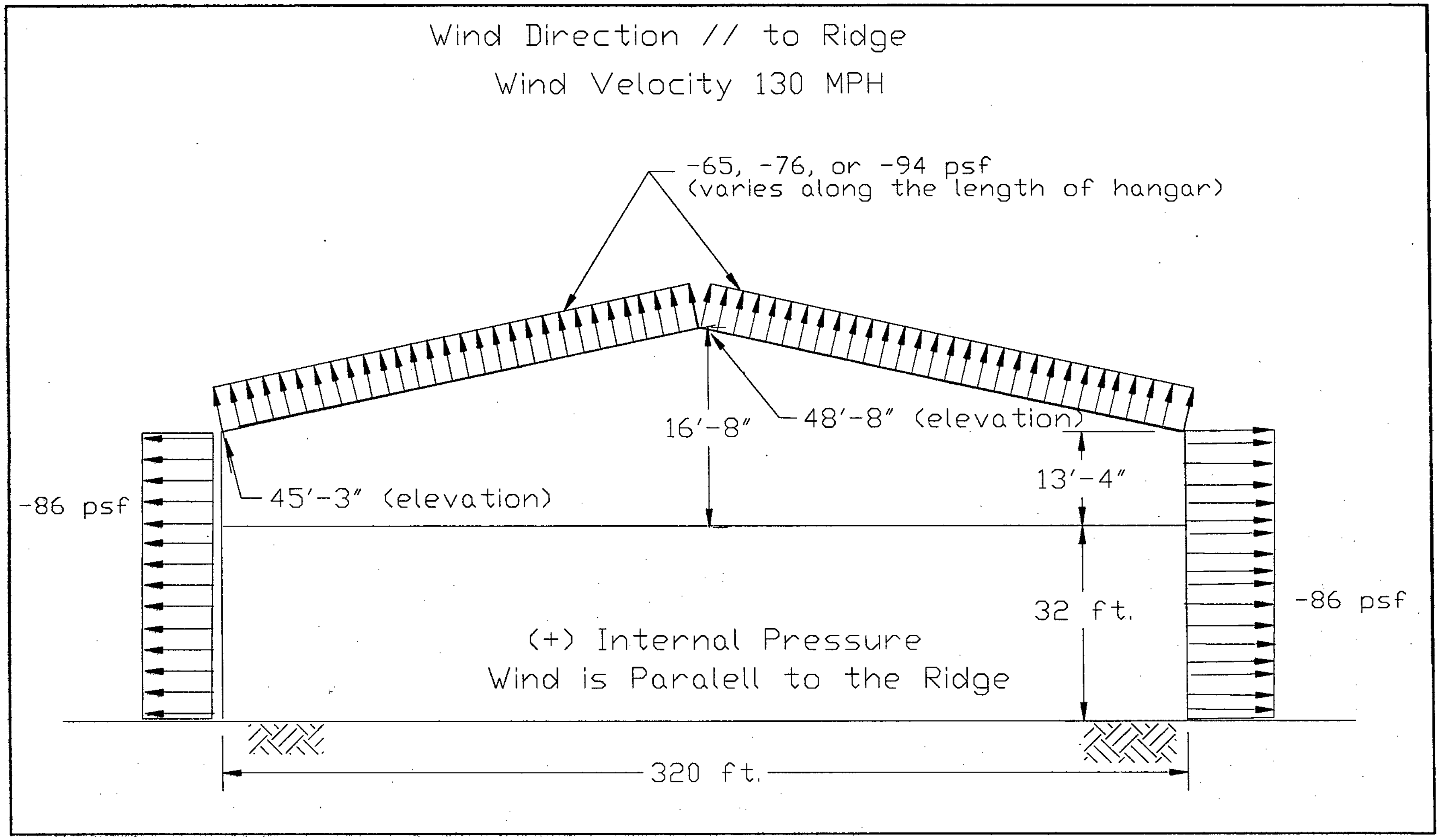

Figure 3.5. CCAD, TX, wind pressure distribution for all hangars (wind IV).

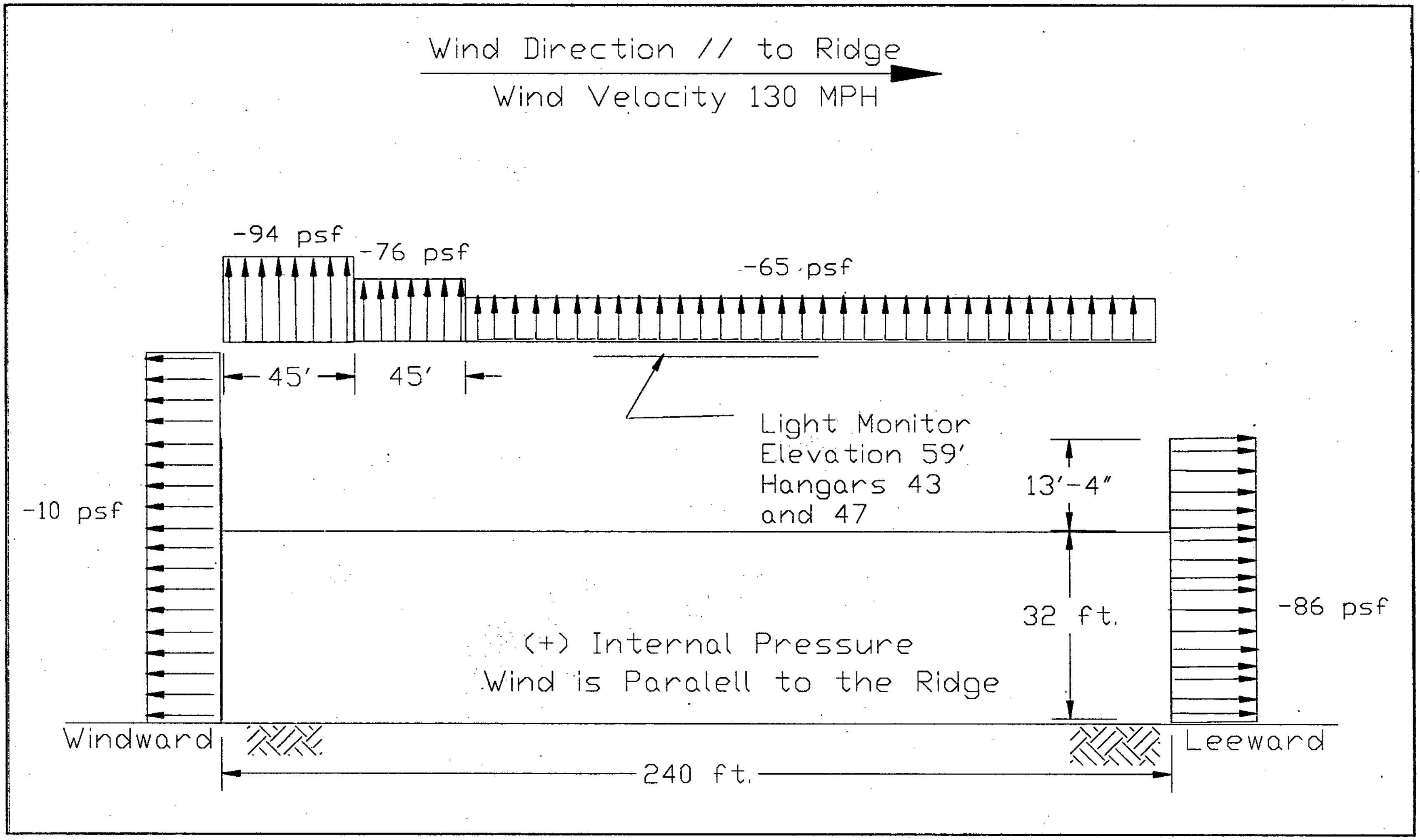

Figure 3.6. CCAD, TX, wind pressure distribution for all hangars (wind IV).

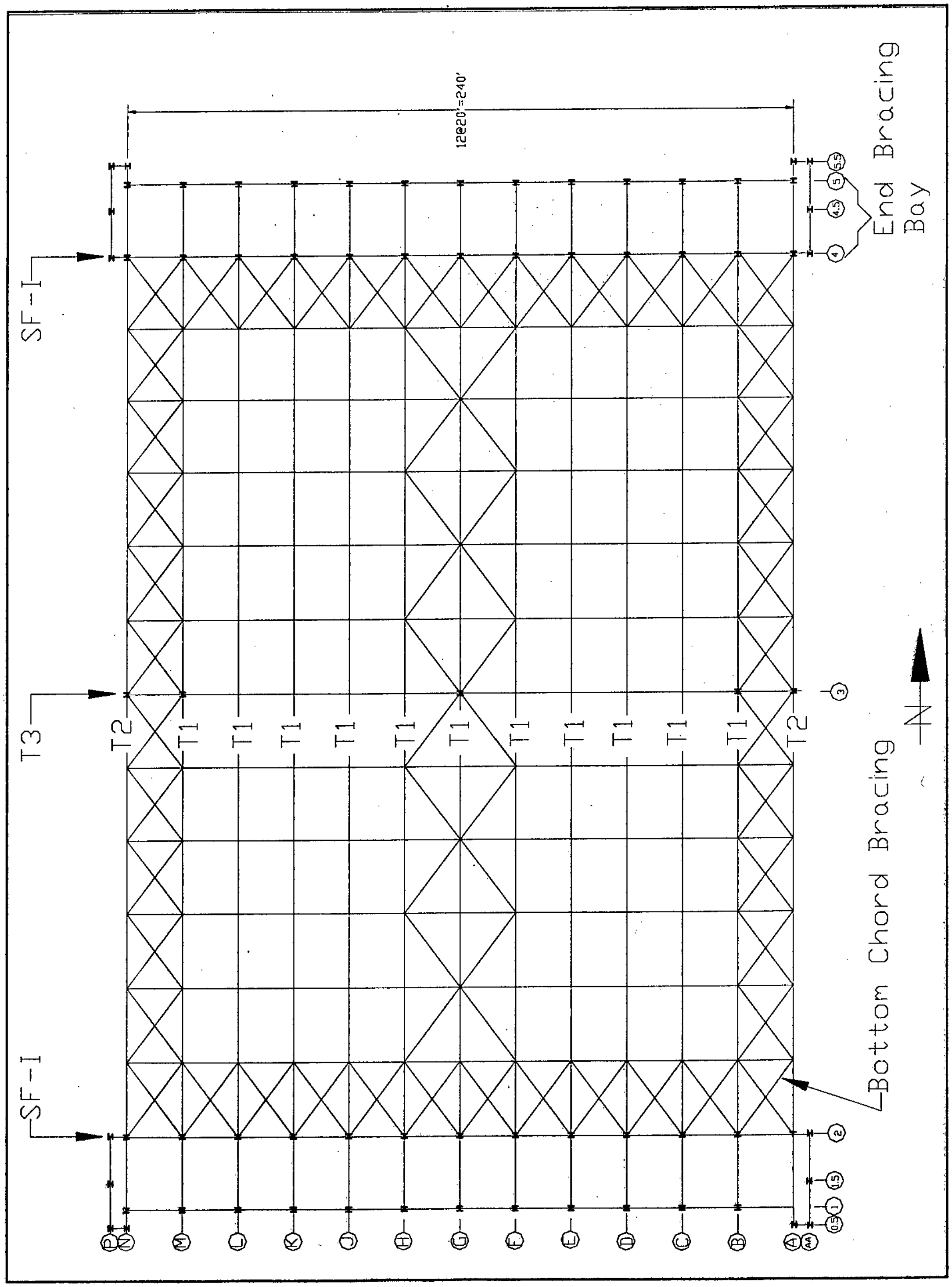

Figure 4.1. CCAD, TX, truss types in Hangars 43 and 47 (plan view).

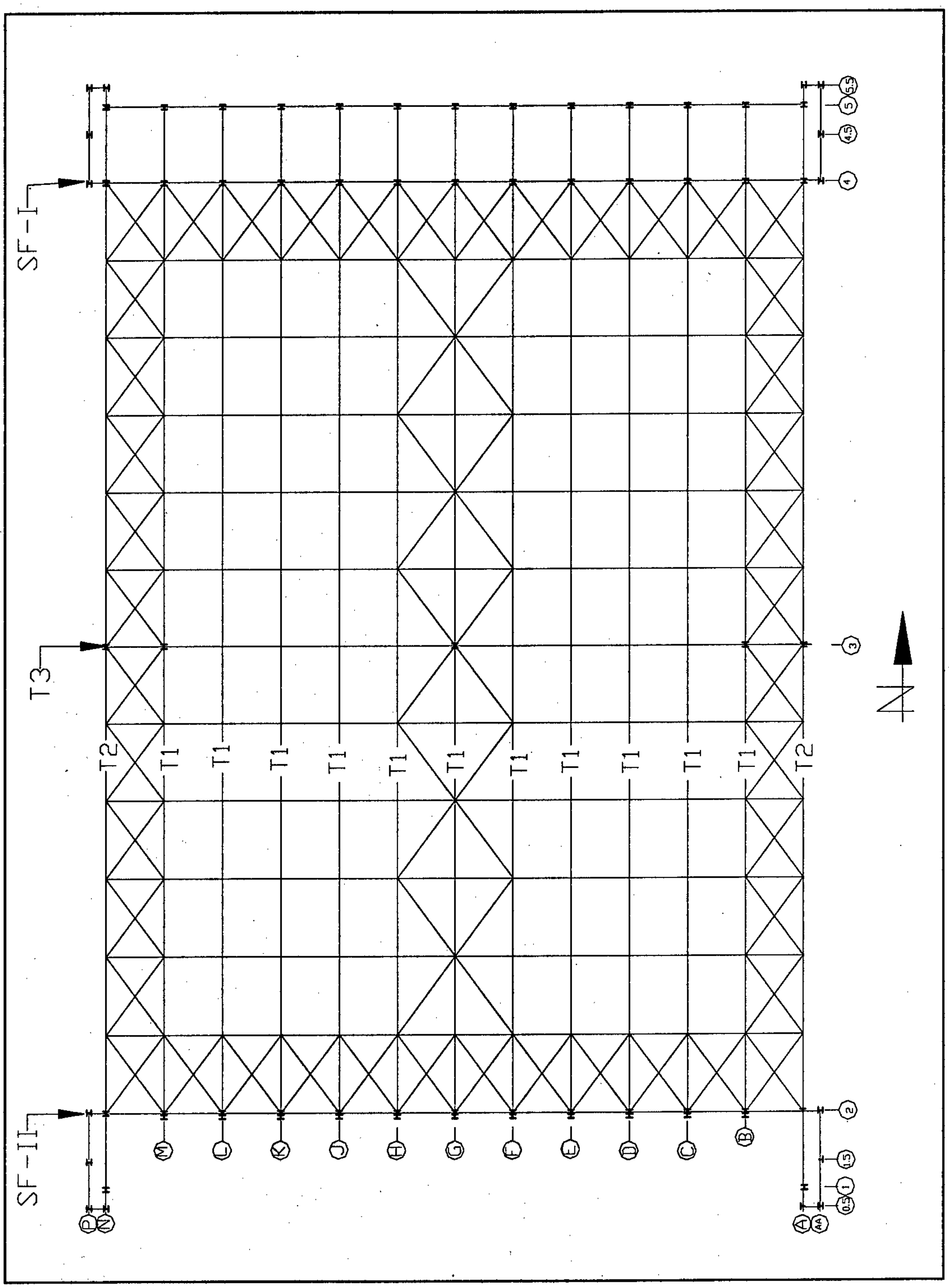

Figure 4.2. CCAD, TX, truss types in Hangars 44 and 45 (plan view).

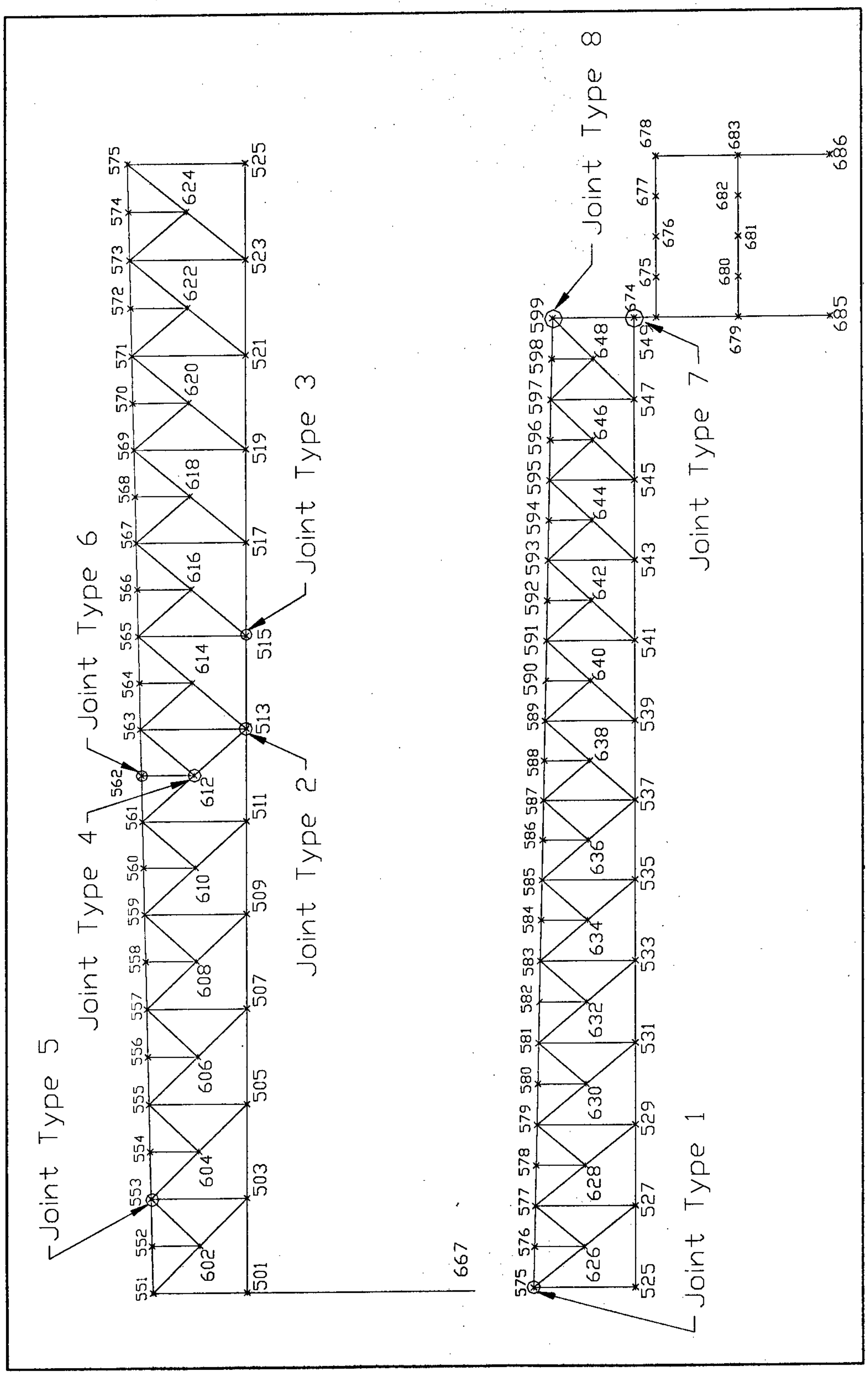

Figure 6.1. CCAD, TX, selected connections from Truss T1, Hangar 45.

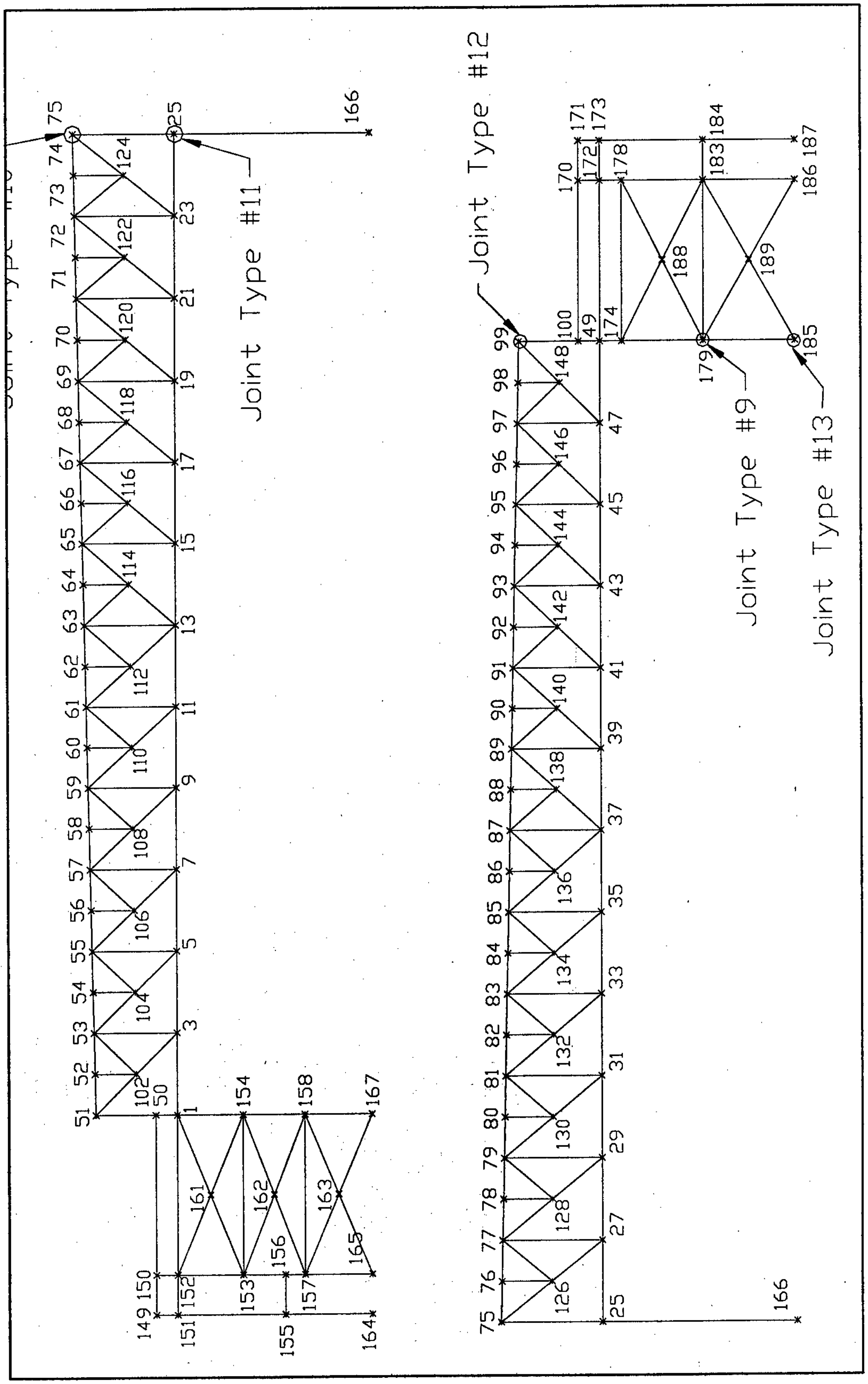

Figure 6.2. CCAD, TX, selected connections for analysis from Truss T2, Hangar 45.

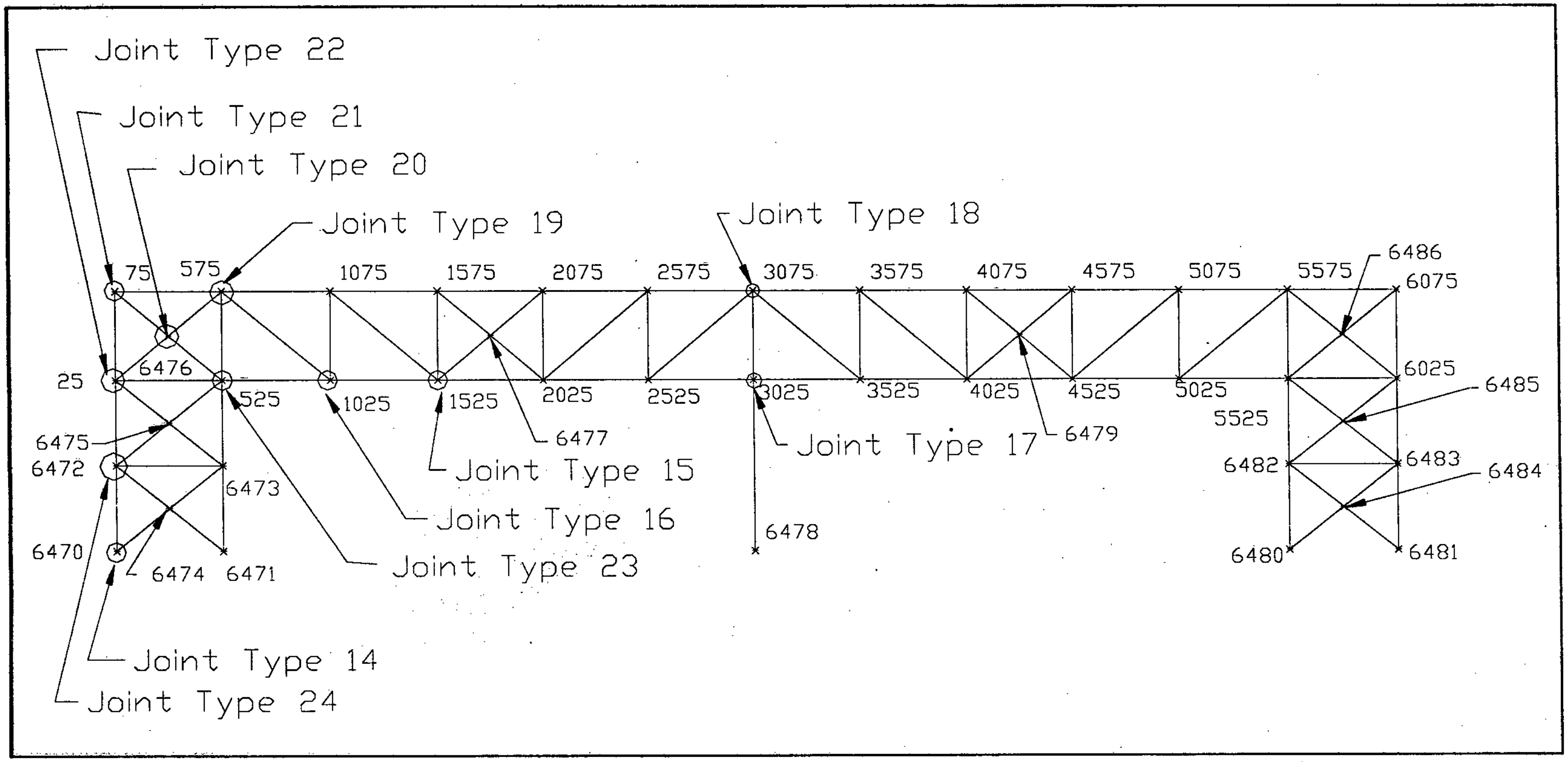

Figure 6.3. CCAD, TX, selected connections for analysis from Truss T3, Hangar 45.

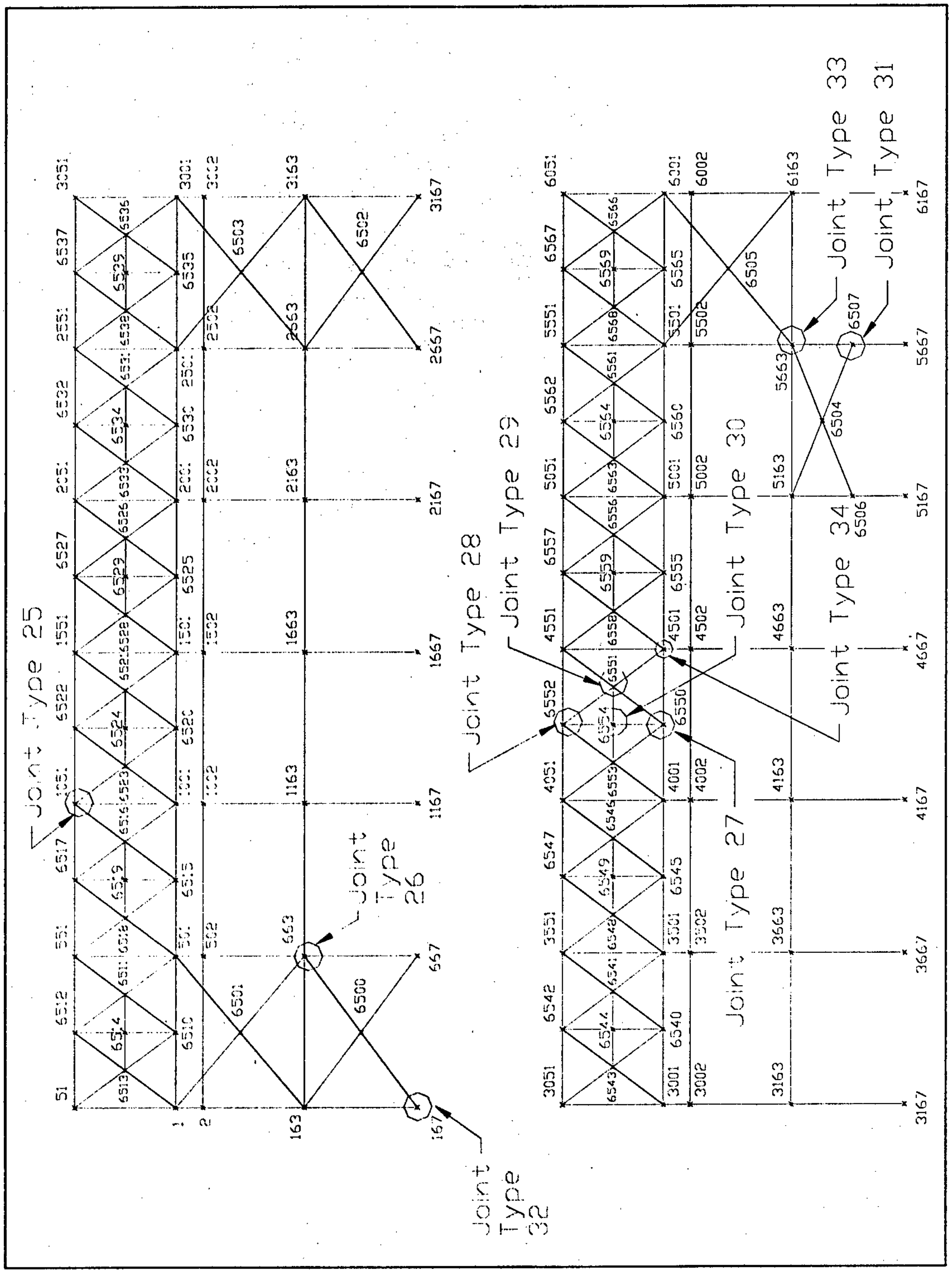

Figure 6.4. CCAD, TX, selected connection for analysis from Truss SF-I, Hangar 45.

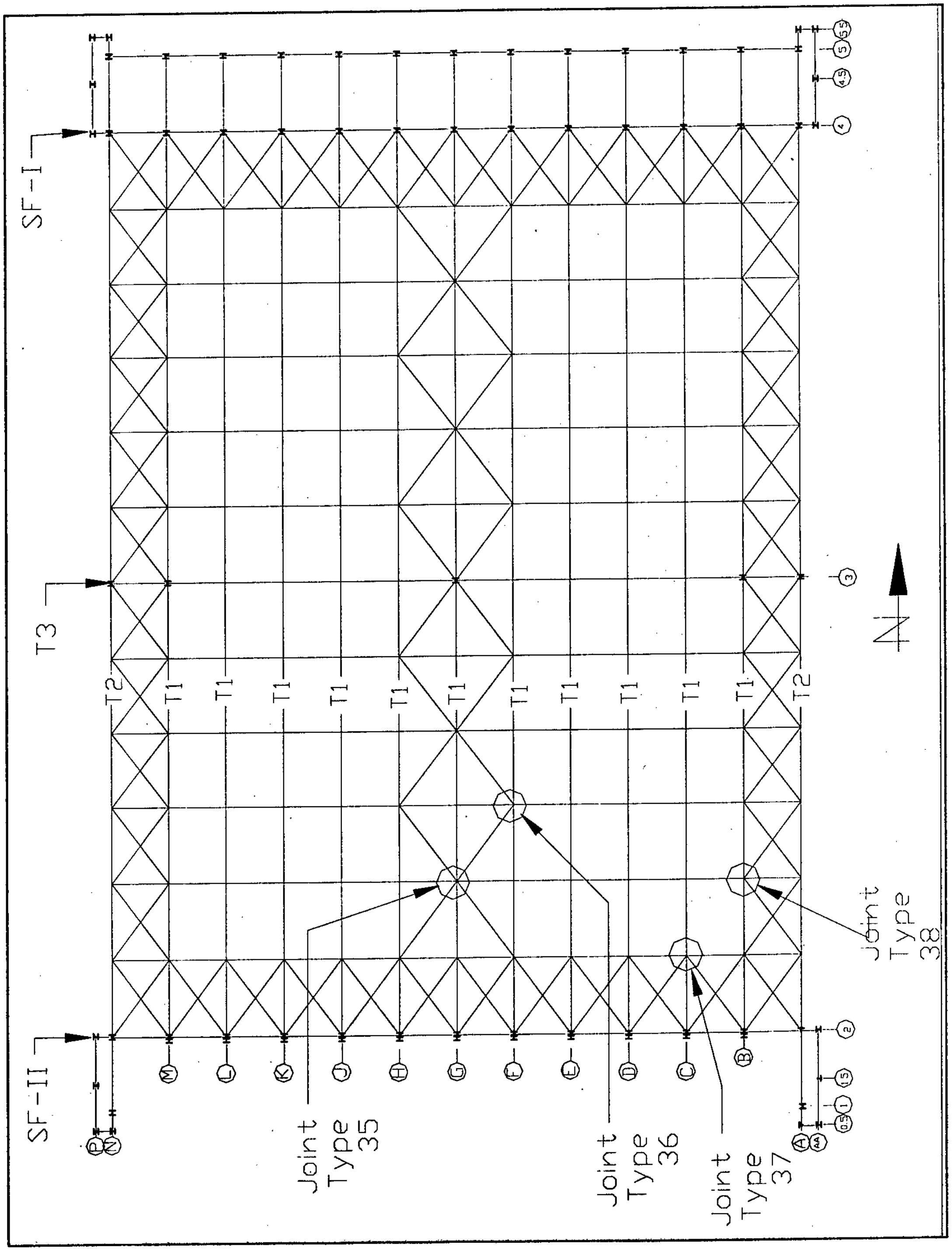

Figure 6.5. CCAD, TX, selected connections for analysis, plan view, Hangar 45.

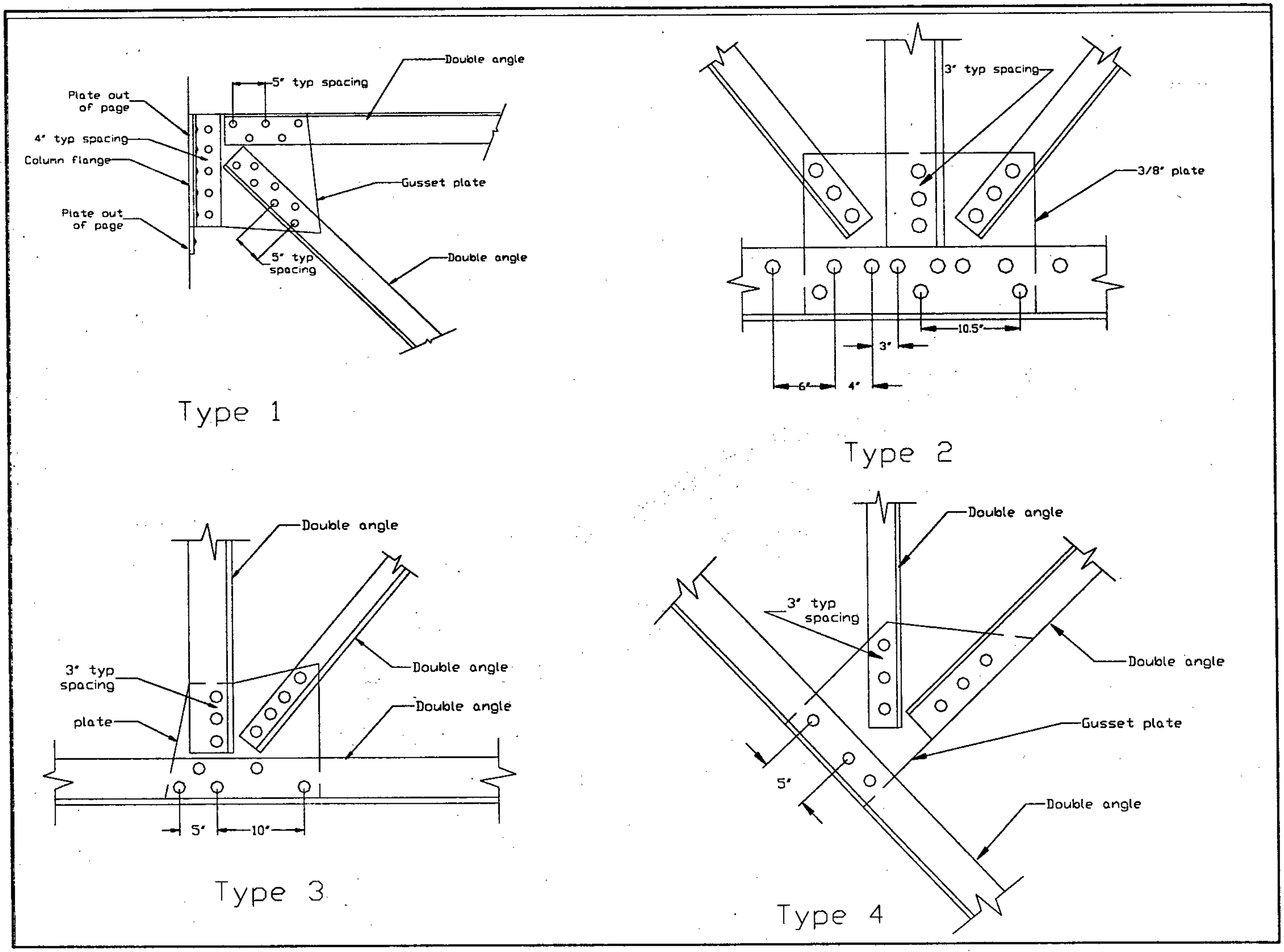

Figure 6.6. CCAD, TX, selected joint types for analysis.

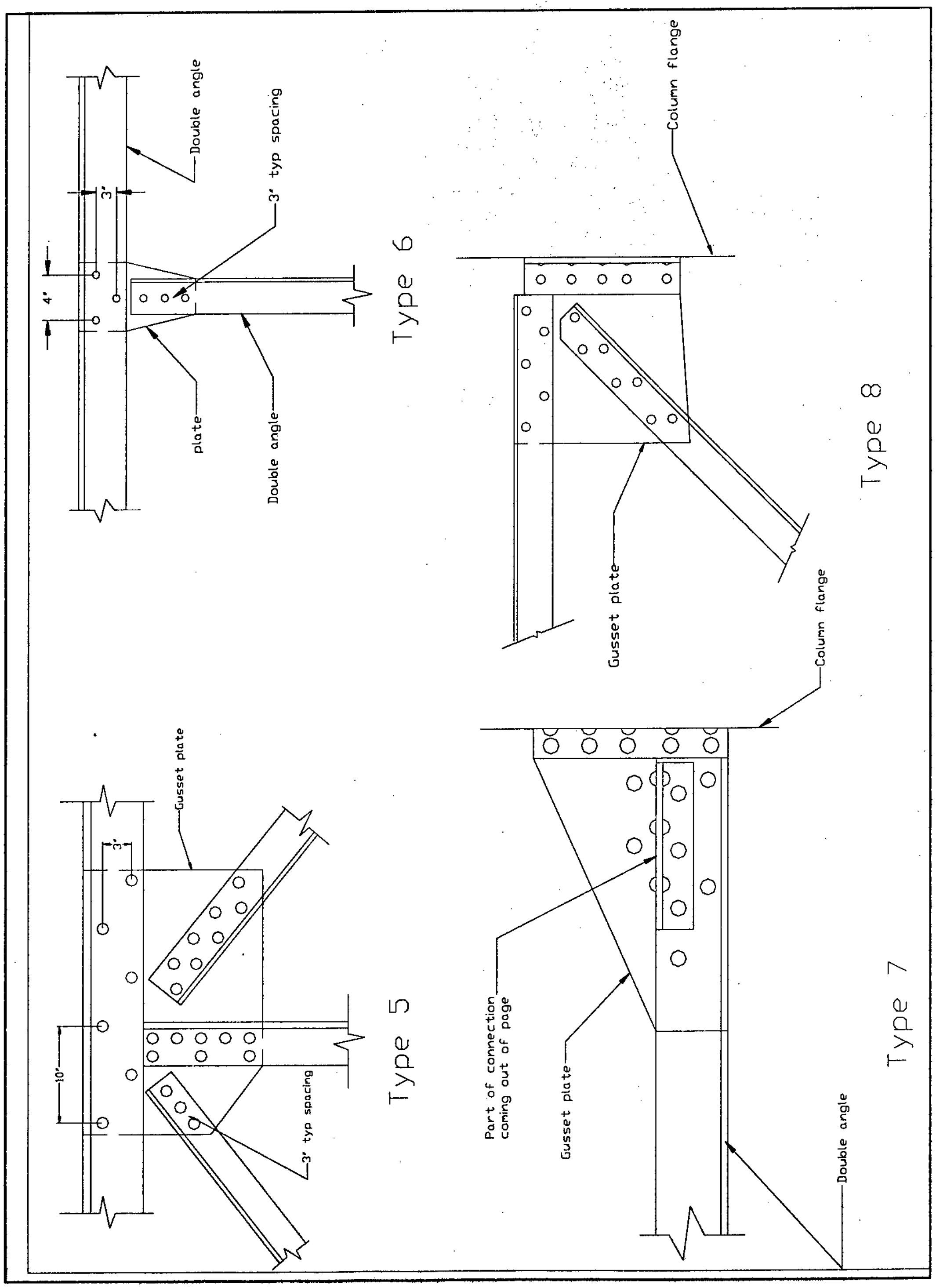

Figure 6.7. CCAD, TX, selected joint types for analysis.

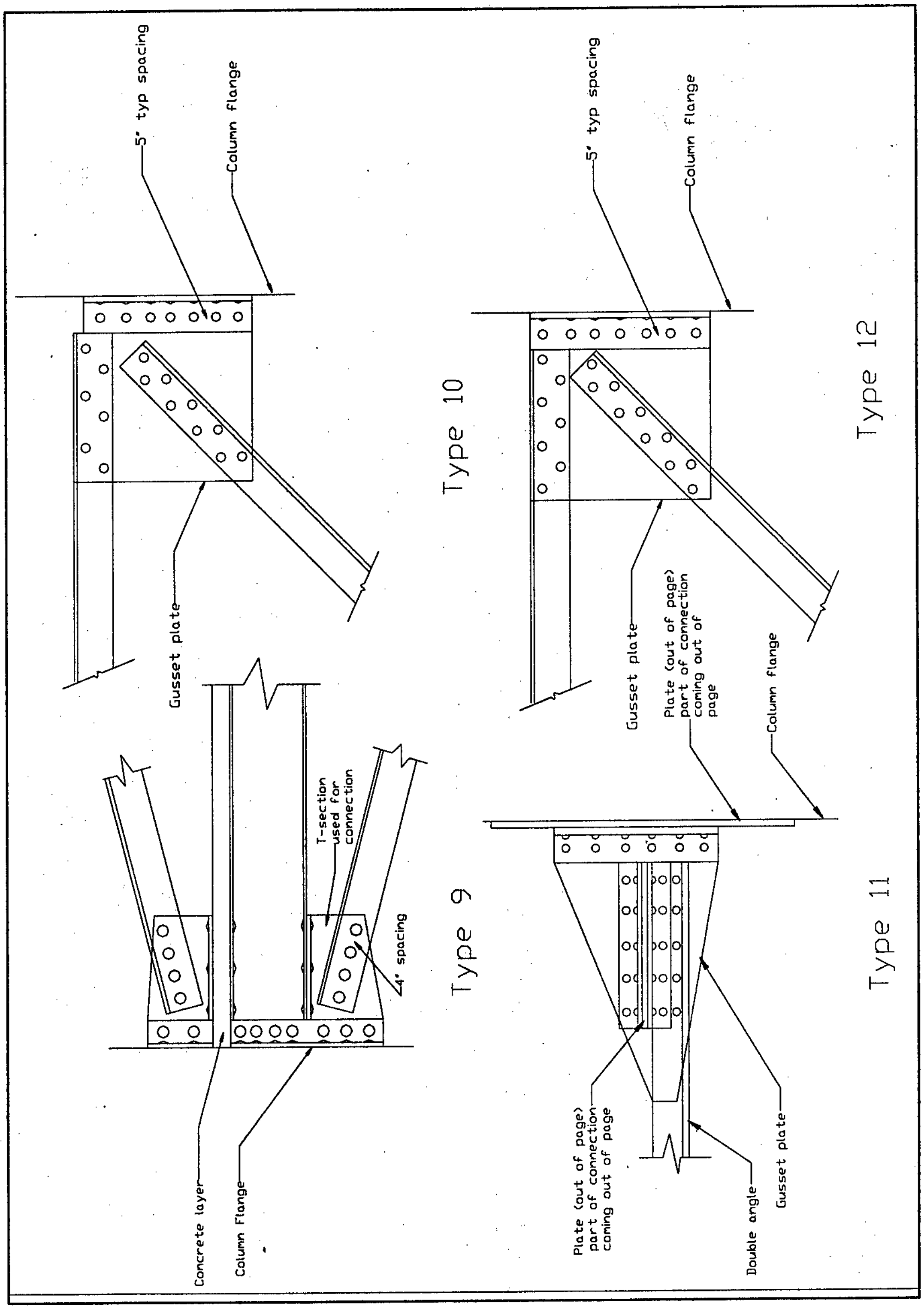

Figure 6.8. CCAD, TX, selected joint types for analysis.

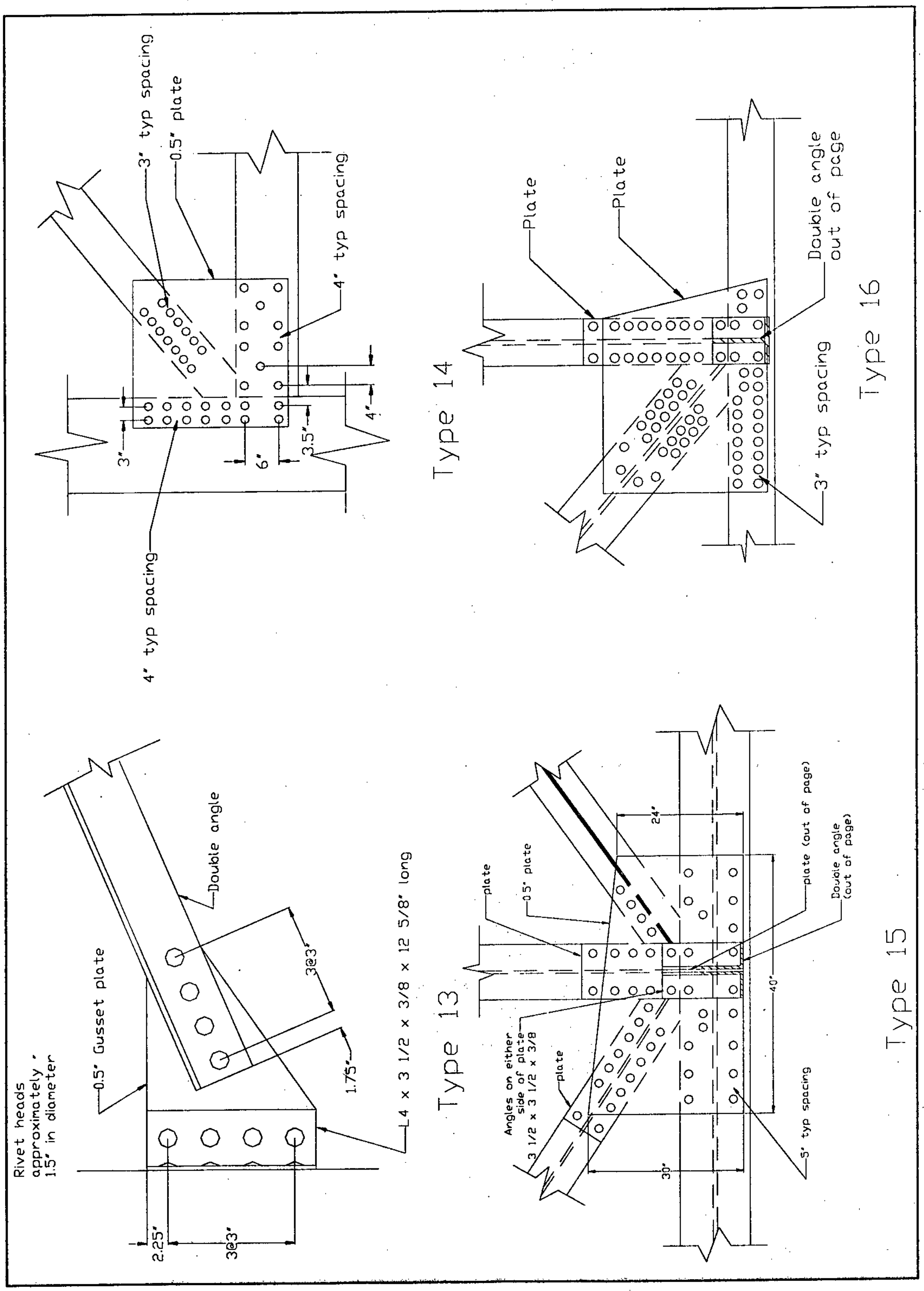

Figure 6.9. CCAD, TX, selected joint types for analysis.

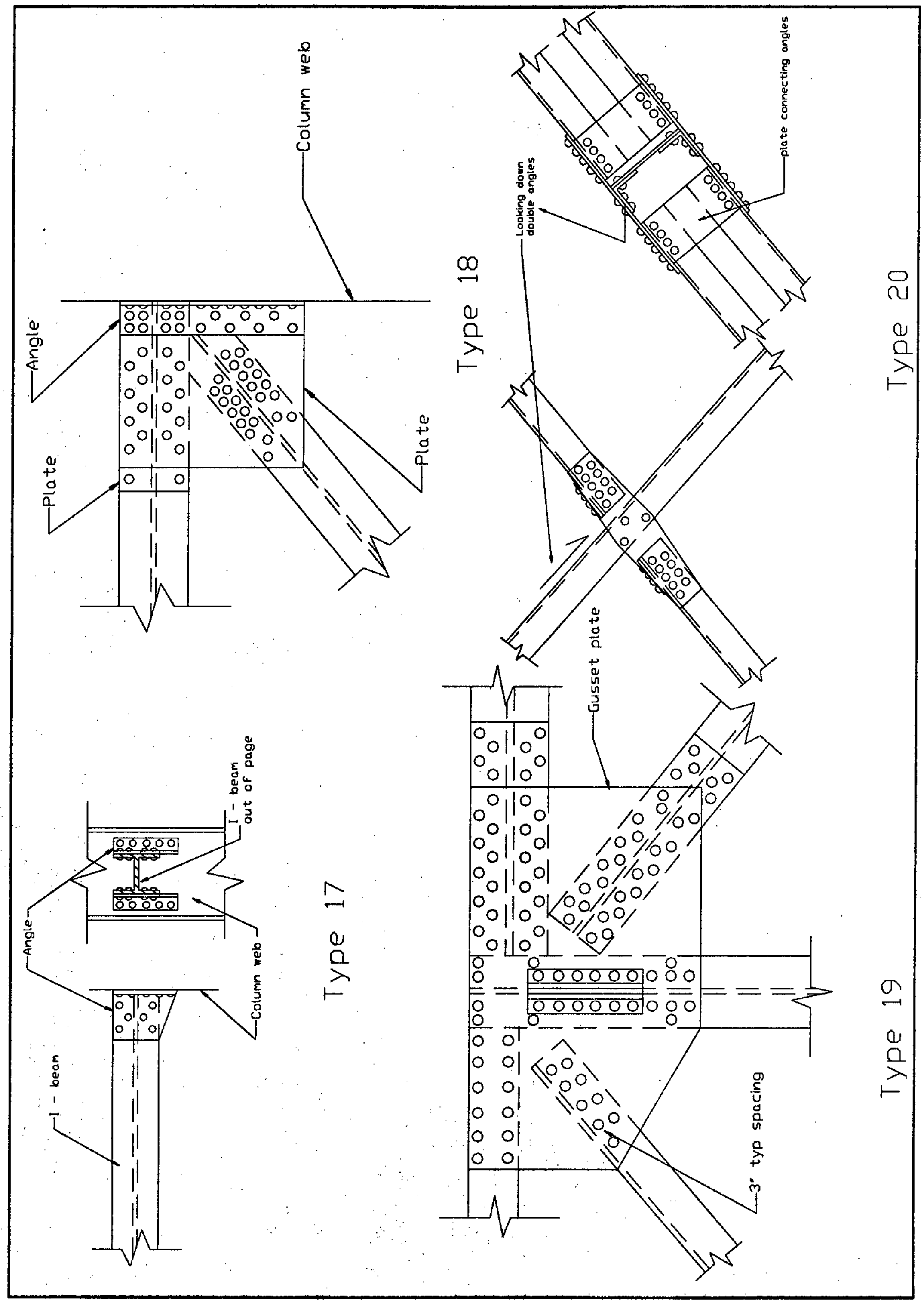

Figure 6.10. CCAD, TX, selected joint types for analysis.

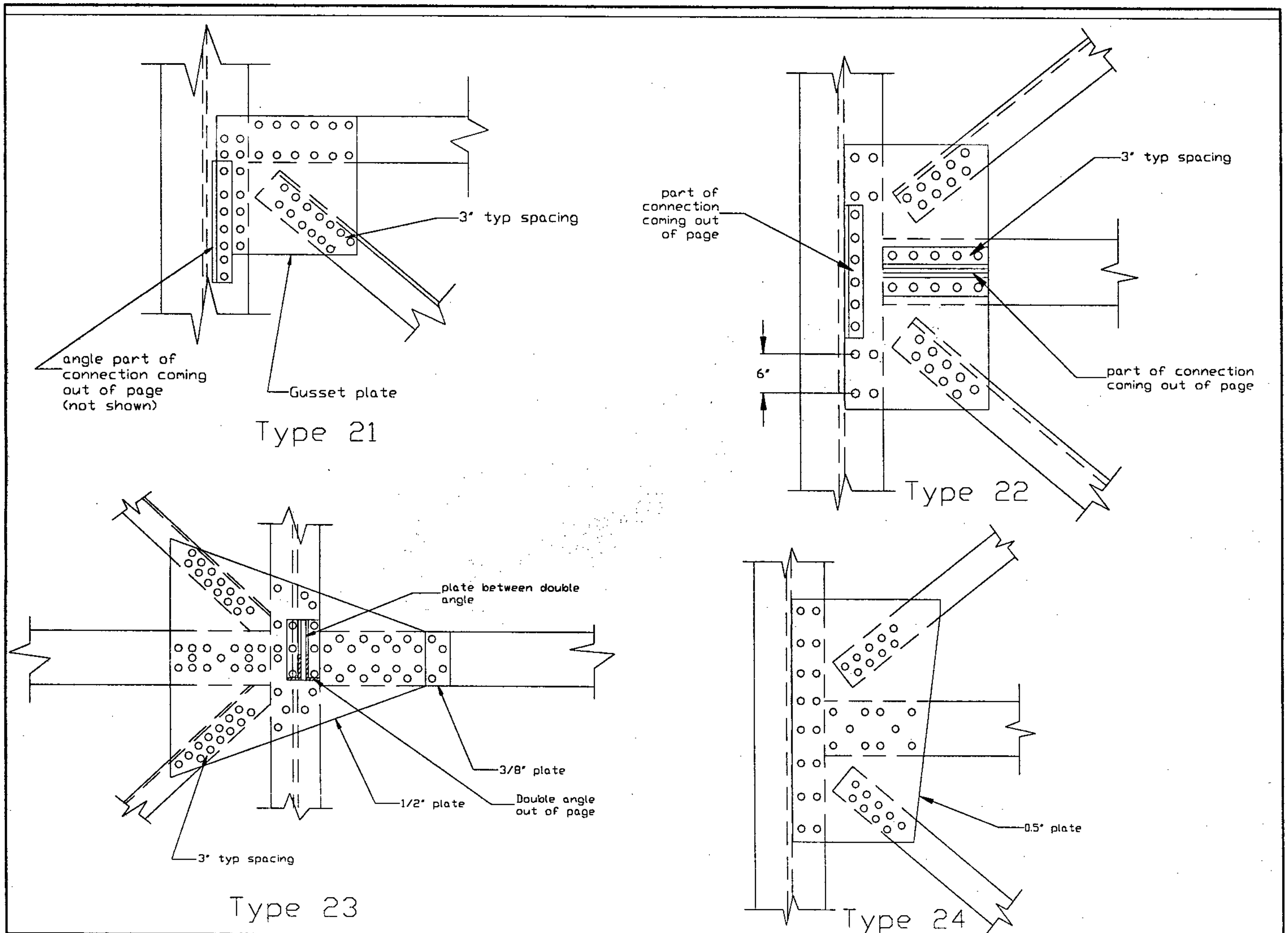

Figure 6.11. CCAD, TX, selected joint types for analysis.

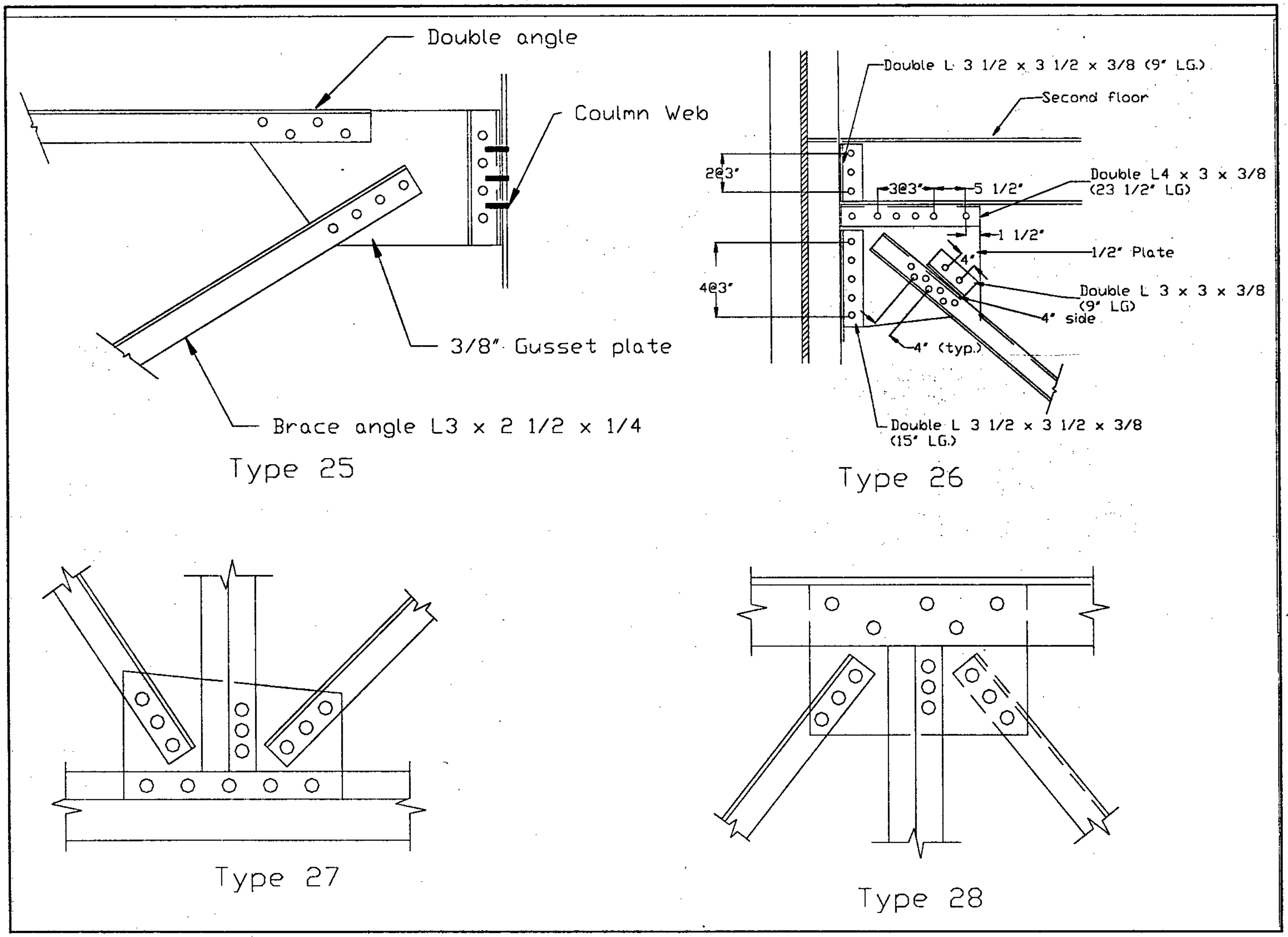

Figure 6.12. CCAD, TX, selected joint types for analysis.

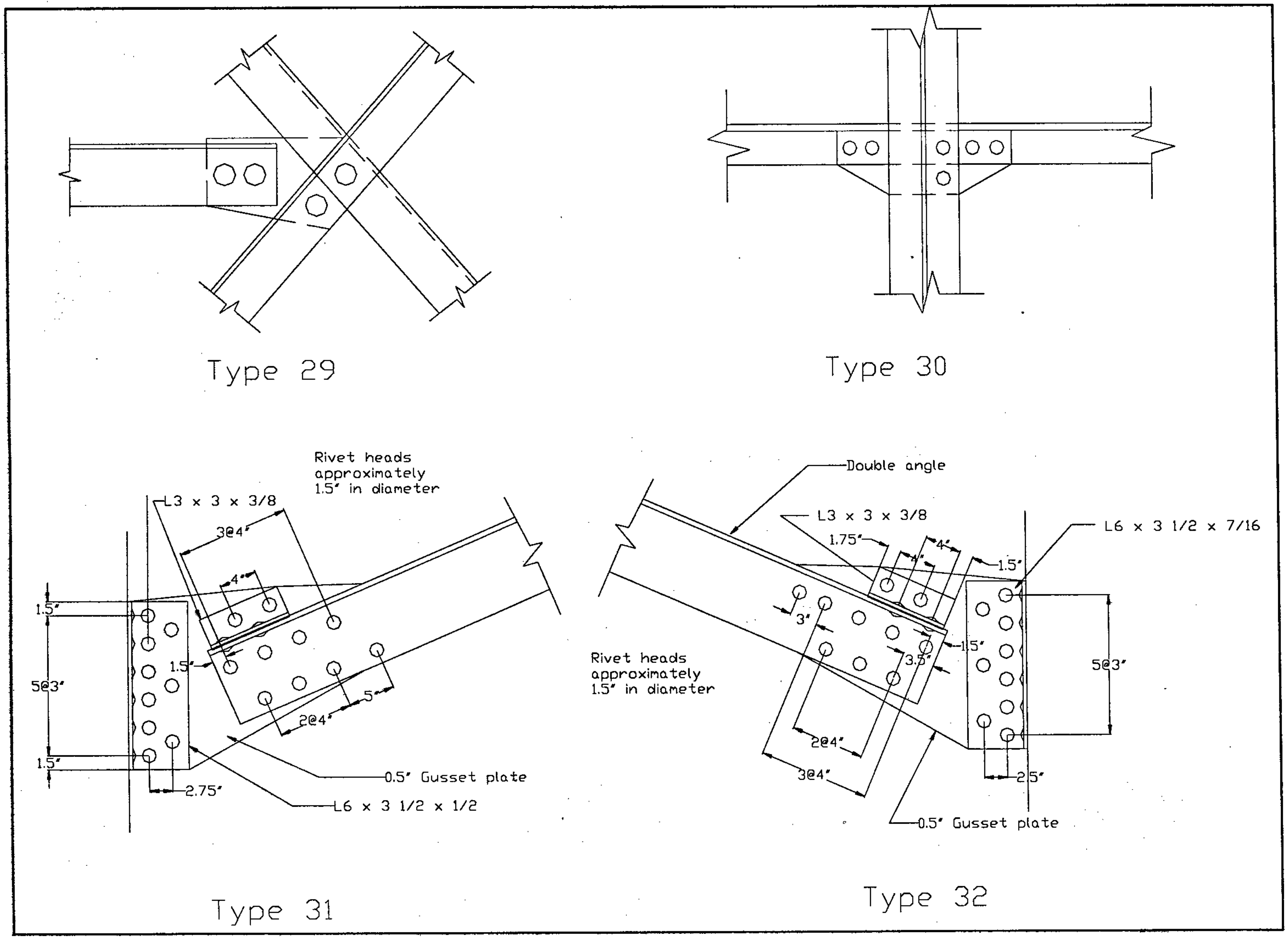

Figure 6.13. CCAD, TX, selected joint types for analysis.

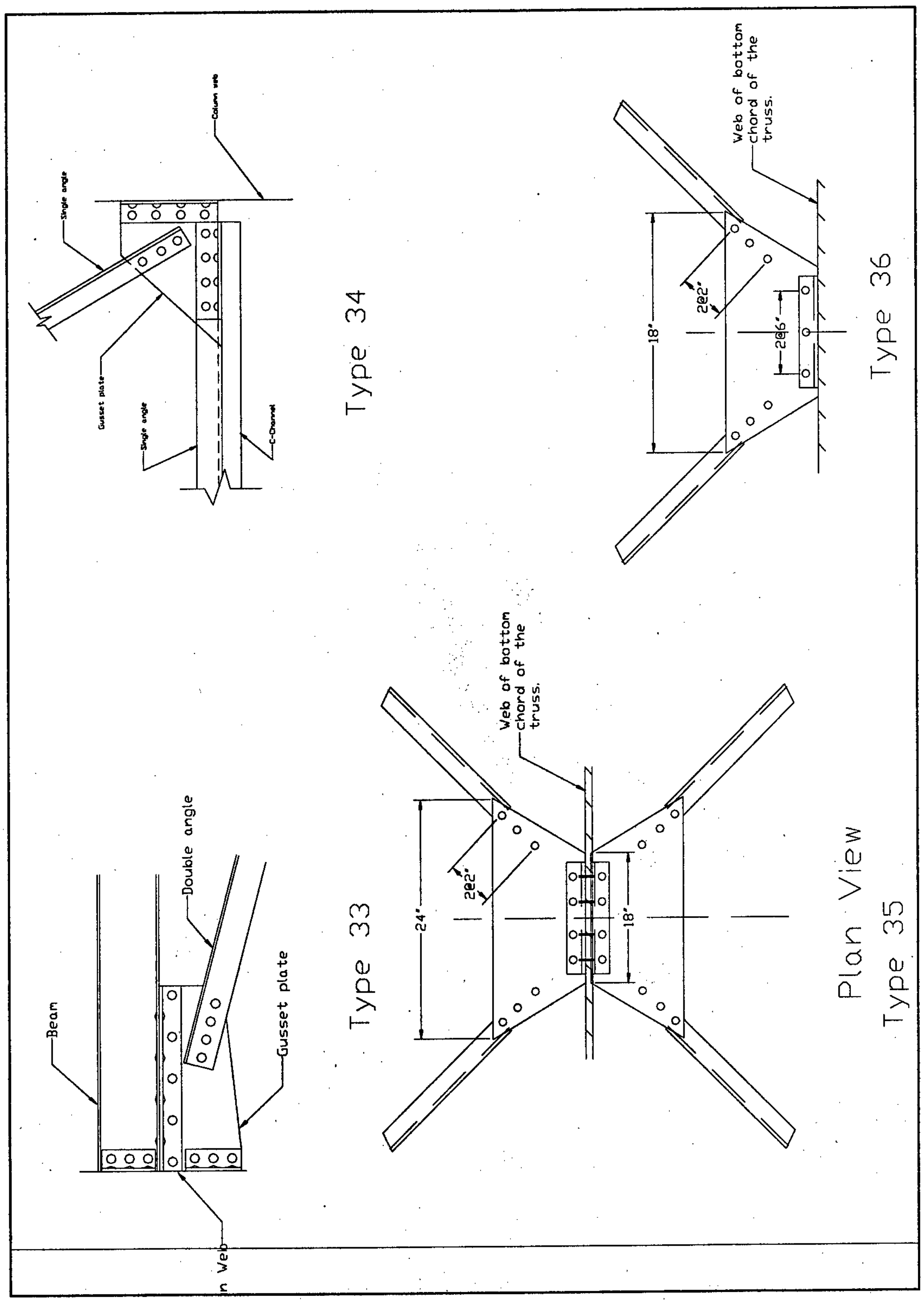

Figure 6.14. CCAD, TX, selected joint types for analysis.

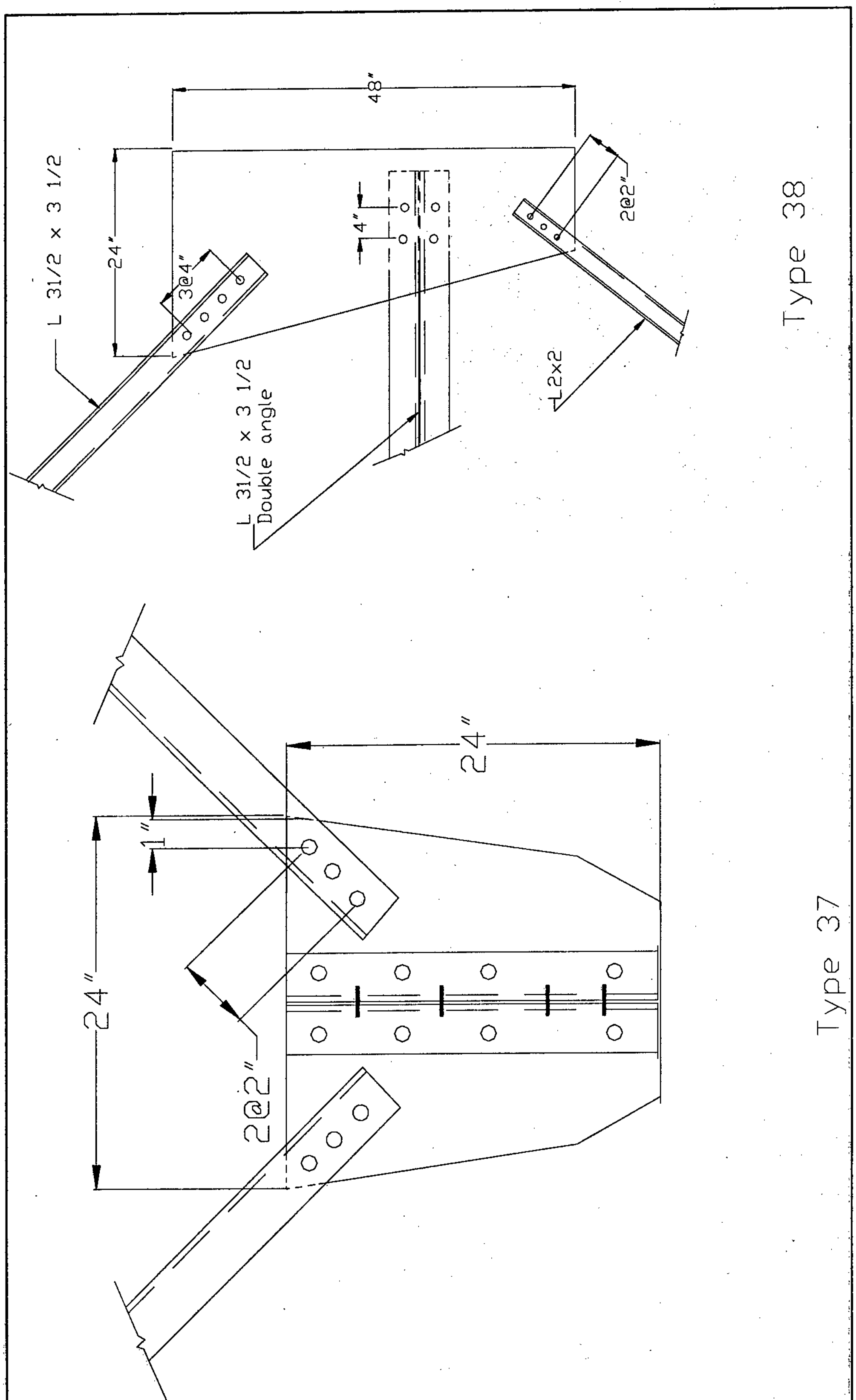

Figure 6.15. CCAD, TX, selected joint types for analysis.

Table 4.1. Truss T1 list of substituted members.

Hangar Number	Section as in Drawings	Section Used for Analysis *	Member Numbers
43, 47 **	18-I-85	W14x76	576,600 820-822 871-873
43, 47	2L 8x6x7/16	2L8x6x1/2	501-508 517-532 541-548
43, 47	18-I-47	W18x46	805-808 835-838
43, 47	24-I-74	W24x68	809-812 859-862
43, 47	18-I-70	W18x65	817,818 867,868
44, 45 **	18-I-85	W18x76	576,600 820 871-873
44, 45	2L 8x6x7/16	2L8x6x1/2	501-508 517-532 541-548
44, 45	18-I-47	W18x46	805-808 835-838
44, 45	24-I-74	W24x68	809-812 859-862
44, 45	18-I-70	W18x65	817, 818 867, 868

* Sections are Standard AISC Rolled Shapes

** Also Applies to # 823 and # 874 for Trusses with Knee Braces

Table 4.2. Truss T2 list of substituted members.

Hangar Number	Section as in Drawings	Section Used for Analysis *	Member Numbers
43, 47 **	18-I-64	W18x65	49, 50, 76, 100 371-373 320-322
43, 47	2L6x6x9/16	2L6x6x1/2	51-54, 59-61 64-66, 71-74
43, 47	2L6x6x11/16	2L6x6x5/8	55-58 67-70
43, 47	8-I-17	W8x18	301, 352
43, 47	12-I-23	W12x22	302 351
43, 47	10-I-21	W10x22	303, 313 354, 363
43, 47	14-I-30	W14x30	304, 308 353, 355-358
43, 47	18-I-47	W18x46	309-312, 317-319 331, 367-370 359-362
43, 47	8-H-31	W8x31 ***	314-316 364-366
43, 47	14-I-87	W14x90	88 385
44, 45 ****	18-I-64	W18x65	49, 50, 76, 100 371-373 318, 320, 321
44, 45	2L6x6x9/16	2L6x6x1/2	51-54, 59-61 64-66, 71-74
44, 45	2L6x6x11/16	2L6x6x5/8	55-58 67-70
44, 45	8-I-17	W8x18	301 352
44, 45	12-I-23	W12x22	351
44, 45	10-I-21	W10x22	303 354, 363
44, 45	14-I-30	W14x30	302, 353 355-358
44, 45	18-I-47	W18x46	312, 314-319 367-370 359-362
44, 45	8-H-31	W8x31 ***	310, 311, 316 364-366
44, 45	14-I-87	W14x90	88 385

* Sections are Standard AISC Rolled Shapes
** Also Applies to # 333 and # 384 for Trusses with Knee Braces
*** In Weak Axis Bending
**** Also Applies to # 340 and # 384 for Trusses with Knee Braces

Table 4.3. Truss T3 list of substituted members.

Hangar Number	Section as in Drawings	Section Used for Analysis *	Member Numbers
43, 47	14-H-87	W14x90	7351, 7355, 7356, 7360 7376-7378, 7394-7396
43, 47	14-I-142	W14x145	7379-7381 7391-7393
43, 47	14-H-78	W14x72	7363, 7366-7369 7364, 7371, 7372
43, 47	14x12-I-78	W14x74	7411, 7418 7419, 7426
43, 47	14x10-I-61	W14x61	7382, 7385 7387, 7390
43, 47	14x8-I-43	W14x43	7383-7384, 7388-7389 7417, 7420, 7425
43, 47 **	33-I-200	W33x201	7386 7397
44, 45	14-H-87	W14x90	7351, 7355, 7356, 7360 7376-7378, 7394-7396
44, 45	14-I-142	W14x145	7379-7381 7391-7393
44, 45	14-H-78	W14x72	7363, 7366-7369 7364, 7371, 7372
44, 45	14x12-I-78	W14x74	7411, 7418 7419, 7426
44, 45	14x10-I-61	W14x61	7382, 7385 7387, 7390
44, 45	14x8-I-43	W14x43	7383-7384, 7388-7389 7417, 7420, 7425
44, 45 **	33-I-200	W33x201	7386 7397

* Sections are Standard AISC Rolled Shapes

** Also Applies to # 8 for Trusses with Knee Braces

*** All Sections are in Weak Axis Bending

Table 4.4. Truss SF list of substituted members.

Type Number	Section as in Drawings	Section Used for Analysis *	Member Numbers
I	18-I-64	W18x65	1-3, 113 39-41, 125
I	12-I-40	W12x40	7821, 7826 7831, 7832
I	18-I-85	W18x76	4-38 114-124
I	10-I-21	W10x22	101-112
I	14-I-30	W14x30	7823, 7830
II	18-I-64	W18x65	62, 74, 75 89, 90, 102
II	14-I-30	W14x30	37-48
II	18-I-85	W18x76	91-101, 63-73 76-88

* Sections are Standard AISC Rolled Shapes

Table 5.1. Truss and load combinations analyzed using SAP90.

			Wind Loading							
			Normal to Ridge				Parallel to Ridge			
			(+) internal pressure		(-) internal pressure		(+) internal pressure		(-) internal pressure	
Truss	Comment	Hangar/Type	As Shown **	Average	As Shown **	Average	As Shown **	Average	As Shown **	Average
T1 +	As Built *	43 and 47	x		x		x	x	x	x
		44 and 45	x		x		x	x	x	x
	Retrofitted	43 and 47	x		x		x	x	x	x
	Knee Braces	44 and 45	x		x		x	x	x	x
T2	As Built *	43 and 47	x		x		x		x	
		44 and 45	x		x		x		x	
	Retrofitted	43 and 47	x		x		x		x	
	Knee Braces	44 and 45	x		x		x		x	
T3	As Built *	43 and 47					x	x	x	x
		44 and 45					x	x	x	x
	Retrofitted	43 and 47					x	x	x	x
	Knee Braces	44 and 45					x	x	x	x
SF	As Built *	Type I					x		x	
		Type II					x		x	
	Infill Struts	Type I					x		x	

* As Shown in Structural Drawings: [5],[15],[4],[6],[16]

** As Shown in Wind Loading Figures 3.1 through 3.6

+ Used Maximum Wind Pressure for Wind Parallel to Ridge Case

Table 5.2. Hangars 43 and 47 Truss T1 Maximum Wind, Tension.

Bay	Mem.	Section	#	Length (in)	Computed			N0 FOS *		
					Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160						
1	HT l	8x6x7/16	501	120	0.847	0.337	0.511	0.539	0.202	0.337
	r	8x6x7/16	502	120	0.847	0.336	0.511	0.539	0.202	0.337
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.690	0.690	0.000	0.414	0.414	0.000
2	HT l	8x6x7/16	503	120	1.104	0.540	0.564	0.696	0.324	0.372
	r	8x6x7/16	504	120	1.104	0.539	0.564	0.696	0.323	0.372
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167	0.508	0.508	0.000	0.305	0.305	0.000
3	HT l	8x6x7/16	505	120	1.160	0.679	0.481	0.725	0.407	0.317
	r	8x6x7/16	506	120	1.159	0.678	0.481	0.724	0.407	0.317
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	1.151	0.747	0.403	0.714	0.448	0.266
	r	8x6x7/16	508	120	1.150	0.747	0.403	0.714	0.448	0.266
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	1.028	0.754	0.274	0.633	0.452	0.181
	r	8x6x1/2	510	120	1.028	0.754	0.274	0.633	0.452	0.181
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.889	0.698	0.190	0.544	0.419	0.125
	r	8x6x1/2	512	120	0.889	0.698	0.190	0.544	0.419	0.125
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	1.082	0.694	0.387	0.672	0.416	0.255
	r	8x6x1/2	514	120	1.081	0.694	0.387	0.672	0.416	0.255
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	1.154	0.577	0.577	0.727	0.346	0.381
	r	8x6x1/2	516	120	1.154	0.577	0.577	0.727	0.346	0.381
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187	0.621	0.621	0.000	0.373	0.373	0.000
9	HT l	8x6x7/16	517	120	1.028	0.408	0.621	0.655	0.245	0.410
	r	8x6x7/16	518	120	1.028	0.407	0.621	0.654	0.244	0.410
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.769	0.769	0.000	0.461	0.461	0.000
10	HT l	8x6x7/16	519	120	0.801	0.190	0.611	0.517	0.114	0.403
	r	8x6x7/16	520	120						
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193	0.725	0.725	0.000	0.435	0.435	0.000
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.976	0.901	0.075	0.590	0.541	0.050
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.853	0.853	0.000	0.512	0.512	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.527	1.461	0.065	0.920	0.877	0.043
12	D b	5x31/2x5/16	723	156						
	t	5x31/2x5/16	724	156						
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			N0 FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	W14x61	588	200	0.737	0.737	0.000	0.442	0.442	0.000
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.527	1.461	0.065	0.920	0.877	0.043
13	D t	5x31/2x5/16	725	156						
	b	5x31/2x5/16	726	156						
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.853	0.853	0.000	0.512	0.512	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.976	0.901	0.075	0.590	0.541	0.050
14	D t	5x3x5/16	727	155						
	b	5x3x5/16	728	155						
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193	0.725	0.725	0.000	0.435	0.435	0.000
15	HT l	8x6x7/16	529	120	0.800	0.189	0.611	0.517	0.113	0.403
	r	8x6x7/16	530	120	0.801	0.190	0.611	0.517	0.114	0.403
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190	0.769	0.769	0.000	0.461	0.461	0.000
16	HT l	8x6x7/16	531	120	1.028	0.407	0.621	0.654	0.244	0.410
	r	8x6x7/16	532	120	1.028	0.408	0.621	0.655	0.245	0.410
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187	0.621	0.621	0.000	0.373	0.373	0.000
17	HT l	8x6x1/2	533	120	1.154	0.577	0.577	0.727	0.346	0.381
	r	8x6x1/2	534	120	1.154	0.577	0.577	0.727	0.346	0.381
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	1.081	0.694	0.387	0.672	0.416	0.255
	r	8x6x1/2	536	120	1.082	0.694	0.387	0.672	0.416	0.255
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.889	0.698	0.190	0.544	0.419	0.125
	r	8x6x1/2	538	120	0.889	0.698	0.190	0.544	0.419	0.125
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	1.028	0.754	0.274	0.633	0.452	0.181
	r	8x6x1/2	540	120	1.028	0.754	0.274	0.633	0.452	0.181
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	1.150	0.747	0.403	0.714	0.448	0.266
	r	8x6x7/16	542	120	1.151	0.747	0.403	0.714	0.448	0.266
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	1.159	0.678	0.481	0.724	0.407	0.317
	r	8x6x7/16	544	120	1.160	0.679	0.481	0.725	0.407	0.317
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167	0.508	0.508	0.000	0.305	0.305	0.000
23	HT l	8x6x7/16	545	120	1.104	0.539	0.564	0.696	0.323	0.372
	r	8x6x7/16	546	120	1.104	0.540	0.564	0.696	0.324	0.372
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163	0.691	0.691	0.000	0.415	0.415	0.000
24	HT l	8x6x7/16	547	120	0.847	0.336	0.511	0.539	0.202	0.337
	r	8x6x7/16	548	120	0.848	0.337	0.511	0.539	0.202	0.337
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144	0.554	0.524	0.019	0.327	0.314	0.013
	t	5x31/2x5/16	748	144	0.542	0.523	0.019	0.326	0.314	0.013
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
South End	1S	18-I-47	805	78	0.623	0.045	0.575	0.407	0.027	0.380
		18-I-47	806	78						
		18-I-47	807	78						
		18-I-47	808	78	0.800	0.045	0.755	0.525	0.027	0.498
	2S	24-I-74	809	78						
		24-I-74	810	78						
		24-I-74	811	78						
		24-I-74	812	78						
	3S	18-I-70	818	161						
	4S	18-I-70	817	181	0.743	0.017	0.726	0.489	0.010	0.479
	5S	18-I-85	822	43	0.563	0.197	0.366	0.360	0.118	0.242
	6S	18-I-85	821	161	0.651	0.181	0.470	0.419	0.109	0.310
	7S	18-I-85	820	181	0.635	0.084	0.551	0.414	0.050	0.364
North End	1N	18-I-47	835	78	0.628	0.064	0.671	0.481	0.038	0.443
		18-I-47	836	78						
		18-I-47	837	78						
		18-I-47	838	78						
	2N	24-I-74	859	78	0.672	0.013	0.658	0.442	0.008	0.434
		24-I-74	860	78						
		24-I-74	861	78						
		24-I-74	862	78	0.965	0.013	0.952	0.636	0.008	0.628
	3N	18-I-70	868	161						
	4N	18-I-70	867	181						
	5N	18-I-85	873	43	0.563	0.197	0.366	0.360	0.118	0.242
	6N	18-I-85	872	161	0.651	0.181	0.470	0.419	0.109	0.310
	7N	18-I-85	871	181	0.808	0.109	0.699	0.527	0.065	0.461
	Total Overstressed Members				30			0		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

All Sections are Double Angles Unless Otherwise Noted

Table 5.3. Hangars 43 and 47 Truss T1 Maximum Wind, Compression.

							Computed			N0 FOS *		
Bay	Mem	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	1.958	1.621	0.337	1.071	0.849	0.222
	b	5x31/2x5/16	702	144	1.000	1.328	1.890	1.582	0.308	1.032	0.828	0.203
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163								
2	HT	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240								
2	D t	5x3x5/16	703	145	1.000	1.091	1.630	1.475	0.155	0.872	0.770	0.102
	b	5x3x5/16	704	145	1.000	1.091	1.601	1.450	0.151	0.856	0.757	0.100
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167								
3	HT	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	1.002	0.782	0.220	0.553	0.408	0.145
3	D t	31/2x21/2x5/16	705	146			fa>Fe			0.906		
	b	31/2x21/2x5/16	706	146			fa>Fe			0.832		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170								
4	HT	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.642	1.091	0.551	0.933	0.569	0.364
4	D t	3x21/2x5/16	707	147			fa>Fe			0.508		
	b	3x21/2x5/16	708	147			1.803			0.456		
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173								
5	HT	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	1.240	0.946	0.294	0.688	0.494	0.194
5	D t	3x2x5/16	709	148								
	b	3x2x5/16	710	148								
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	1.284	0.953	0.331	0.716	0.497	0.218
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.871	0.661	0.209	0.483	0.345	0.138
7	D b	4x3x5/16	713	151	1.000	1.168	1.411	0.954	0.457	0.799	0.498	0.302
	t	4x3x5/16	714	151	1.000	1.168	1.605	1.028	0.576	0.917	0.536	0.380
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	0.676	0.676	0.000	0.353	0.353	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240	1.000	1.861	0.522	0.373	0.149	0.293	0.195	0.098
8	D b	3x2x5/16	715	152			fa>Fe			1.271		
	t	3x2x5/16	716	152			fa>Fe			1.295		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584.	187	2.359	1.670	1.311	1.311	0.000	0.684	0.684	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			1.383		
	t	31/2x21/2x5/16	718	153			fa>Fe			1.389		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.338	1.338	0.000	0.698	0.698	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			1.447		
	t	4x3x5/16	720	154			fa>Fe			1.447		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.301	1.301	0.000	0.679	0.679	0.000
11	HT l	8x6x7/16	521	120	1.000	2.562	0.755	0.088	0.667	0.489	0.049	0.440
	r	8x6x7/16	522	120	1.000	2.562	0.789	0.089	0.701	0.512	0.049	0.463
11	HB	6x6x3/8	561	240	1.000	1.879	0.575	0.481	0.095	0.314	0.251	0.063
11	D b	5x3x5/16	721	155			fa>Fe			1.497		
	t	5x3x5/16	722	155			fa>Fe			1.497		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.336	1.336	0.000	0.697	0.697	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	1.167	0.426	0.741	0.726	0.237	0.489
	r	8x6x7/16	524	120	1.000	2.562	0.918	0.426	0.492	0.561	0.237	0.325
12	HB	6x6x3/8	562	240	1.000	1.879	0.841	0.714	0.127	0.456	0.373	0.084
12	D b	5x31/2x5/16	723	156			fa>Fe			0.554		
	t	5x31/2x5/16	724	156			fa>Fe			0.559		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.918	0.426	0.492	0.561	0.237	0.325
	r	8x6x7/16	526	120	1.000	2.562	1.167	0.426	0.741	0.726	0.237	0.489
13	HB	6x6x3/8	563	240	1.000	1.879	0.855	0.714	0.142	0.466	0.373	0.094
13	D t	5x31/2x5/16	725	156			fa>Fe			0.559		
	b	5x31/2x5/16	726	156			fa>Fe			0.554		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.810	1.810	0.000	0.944	0.944	0.000
14	HT l	8x6x7/16	527	120	1.000	2.562	0.789	0.089	0.701	0.512	0.049	0.463
	r	8x6x7/16	528	120	1.000	2.562	0.755	0.088	0.667	0.489	0.049	0.440
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			fa>Fe			1.497		
	b	5x3x5/16	728	155			fa>Fe			1.497		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.724	1.724	0.000	0.899	0.899	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			1.447		
	b	4x3x5/16	730	154			fa>Fe			1.447		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.965	1.965	0.000	1.025	1.025	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			1.389		
	b	31/2x21/2x5/16	732	153			fa>Fe			1.383		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.965	1.965	0.000	1.025	1.025	0.000
17	HT l	8x6x1/2	533	120	1.000	2.562	0.524	0.323	0.201	0.312	0.179	0.133
	r	8x6x1/2	534	120	1.000	2.562	0.524	0.323	0.201	0.312	0.179	0.133
17	HB	6x6x1/2	567	240	1.000	1.861	0.522	0.373	0.149	0.293	0.195	0.098
17	D t	3x2x5/16	733	152			fa>Fe			1.295		
	b	3x2x5/16	734	152			fa>Fe			1.271		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	1.292	1.292	0.000	0.674	0.674	0.000
18	HT l	8x6x1/2	535	120	1.000	2.562	0.511	0.371	0.140	0.299	0.206	0.092
	r	8x6x1/2	536	120	1.000	2.562	0.511	0.371	0.140	0.299	0.206	0.092
18	HB	6x6x1/2	568	240	1.000	1.861	0.871	0.662	0.209	0.483	0.345	0.138
18	D t	4x3x5/16	735	151	1.000	1.272	1.605	1.028	0.577	0.918	0.537	0.381
	b	4x3x5/16	736	151	1.000	1.272	1.411	0.954	0.457	0.800	0.498	0.302
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	1.285	0.953	0.331	0.716	0.497	0.218
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120								
	r	8x6x1/2	540	120								
20	HB	6x6x1/2	570	240	1.000	1.861	1.241	0.947	0.294	0.688	0.494	0.194
20	D b	3x2x5/16	739	148								
	t	3x2x5/16	740	148								
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173								
21	HT l	8x6x7/16	541	120	1.000	2.562	0.555	0.381	0.174	0.327	0.212	0.115
	r	8x6x7/16	542	120	1.000	2.562	0.555	0.381	0.174	0.327	0.212	0.115
21	HB	6x6x3/8	571	240	1.000	1.879	1.642	1.091	0.551	0.933	0.569	0.364
21	D b	3x21/2x5/16	741	147			fa>Fe			0.456		
	t	3x21/2x5/16	742	147			fa>Fe			0.508		
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.143	1.143	0.000	0.596	0.596	0.000
22	HT l	8x6x7/16	543	120	1.000	2.562	0.528	0.334	0.193	0.313	0.186	0.127
	r	8x6x7/16	544	120	1.000	2.562	0.528	0.334	0.193	0.313	0.186	0.127
22	HB	6x6x3/8	572	240	1.000	1.879	1.002	0.782	0.220	0.553	0.408	0.145
22	D b	31/2x21/2x5/16	743	146			fa>Fe			0.832		
	t	31/2x21/2x5/16	744	146			fa>Fe			0.906		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.264	1.264	0.000	0.659	0.659	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.601	1.450	0.151	0.856	0.757	0.100
	t	5x3x5/16	746	145	1.000	1.091	1.630	1.475	0.155	0.872	0.770	0.102
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.346	1.346	0.000	0.702	0.702	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	1.891	1.582	0.308	1.032	0.828	0.203
	t	5x31/2x5/16	748	144	1.000	1.328	1.958	1.621	0.337	1.071	0.849	0.222
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South	1S	18-I-47	805	78								
End		18-I-47	806	78								
		18-I-47	807	78								
		18-I-47	808	78								
	2S	24-I-74	809	78	1.000	9.542	0.666	0.026	0.640	0.438	0.015	0.422
		24-I-74	810	78								
		24-I-74	811	78								
		24-I-74	812	78	1.000	9.542	1.014	0.026	0.987	0.667	0.015	0.651
	3S	18-I-70	818	161								
	4S	18-I-70	817	181								
	5S	18-I-85	822	43								
	6S	18-I-85	821	161								
	7S	18-I-85	820	181	1.000	7.723	1.031	0.098	0.933	0.672	0.056	0.616
North	1N	18-I-47	835	78	1.000	7.262	0.727	0.056	0.671	0.476	0.033	0.443
End		18-I-47	836	78								
		18-I-47	837	78								
		18-I-47	838	78	1.000	7.262	0.728	0.056	0.673	0.477	0.033	0.444
	2N	24-I-74	859	78								
		24-I-74	860	78								
		24-I-74	861	78								
		24-I-74	862	78								
	3N	18-I-70	868	161	1.000	7.485	0.520	0.025	0.495	0.341	0.014	0.327
	4N	18-I-70	867	181	1.000	7.485	0.876	0.112	0.764	0.569	0.064	0.504
	5N	18-I-85	873	43								
	6N	18-I-85	872	161								
	7N	18-I-85	871	181	1.000	7.723	0.643	0.078	0.565	0.418	0.045	0.373
Total Overstressed Members							63			22		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.4. Hangars 43 and 47 Truss T1 Average Wind, Tension.

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160						
1	HT l	8x6x7/16	501	120	0.710	0.267	0.442	0.452	0.160	0.292
	r	8x6x7/16	502	120	0.709	0.267	0.442	0.452	0.160	0.292
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.596	0.596	0.000	0.358	0.358	0.000
2	HT l	8x6x7/16	503	120	0.909	0.435	0.474	0.574	0.261	0.313
	r	8x6x7/16	504	120	0.909	0.435	0.474	0.574	0.261	0.313
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167						
3	HT l	8x6x7/16	505	120	0.928	0.542	0.386	0.580	0.325	0.255
	r	8x6x7/16	506	120	0.927	0.541	0.386	0.579	0.325	0.255
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	0.872	0.581	0.291	0.541	0.349	0.192
	r	8x6x7/16	508	120	0.871	0.580	0.291	0.540	0.348	0.192
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	0.772	0.558	0.214	0.476	0.335	0.141
	r	8x6x1/2	510	120	0.771	0.557	0.214	0.475	0.334	0.141
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.680	0.526	0.154	0.417	0.316	0.102
	r	8x6x1/2	512	120	0.680	0.526	0.154	0.417	0.316	0.102
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	0.822	0.525	0.297	0.511	0.315	0.196
	r	8x6x1/2	514	120	0.822	0.525	0.297	0.511	0.315	0.196
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	0.852	0.449	0.403	0.535	0.269	0.266
	r	8x6x1/2	516	120	0.852	0.449	0.403	0.535	0.269	0.266
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187						
9	HT l	8x6x7/16	517	120	0.769	0.338	0.431	0.487	0.203	0.284
	r	8x6x7/16	518	120	0.769	0.338	0.431	0.487	0.203	0.284
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.512	0.512	0.000	0.307	0.307	0.000
10	HT l	8x6x7/16	519	120	0.624	0.197	0.427	0.400	0.118	0.282
	r	8x6x7/16	520	120	0.623	0.196	0.427	0.399	0.118	0.282
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193						
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.645	0.582	0.063	0.391	0.349	0.042
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.574	0.574	0.000	0.344	0.344	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.009	0.956	0.053	0.609	0.574	0.035
12	D b	5x31/2x5/16	723	156						
	t	5x31/2x5/16	724	156						
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
13	V	W14x61	588	200						
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.007	0.956	0.051	0.607	0.574	0.034
13	D t	5x31/2x5/16	725	156	0.717	0.656	0.061	0.434	0.394	0.040
	b	5x31/2x5/16	726	156	0.718	0.657	0.061	0.434	0.394	0.040
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.514	0.514	0.000	0.308	0.308	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.684	0.634	0.050	0.413	0.380	0.033
14	D t	5x3x5/16	727	155	0.626	0.574	0.052	0.379	0.344	0.034
	b	5x3x5/16	728	155	0.638	0.586	0.052	0.386	0.352	0.034
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193						
15	HT l	8x6x7/16	529	120	0.510	0.121	0.389	0.329	0.073	0.257
	r	8x6x7/16	530	120	0.511	0.122	0.389	0.330	0.073	0.257
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190						
16	HT l	8x6x7/16	531	120	0.637	0.248	0.389	0.406	0.149	0.257
	r	8x6x7/16	532	120	0.637	0.248	0.389	0.406	0.149	0.257
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187						
17	HT l	8x6x1/2	533	120	0.523	0.322	0.201	0.326	0.193	0.133
	r	8x6x1/2	534	120	0.523	0.322	0.201	0.326	0.193	0.133
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	0.670	0.422	0.248	0.417	0.253	0.164
	r	8x6x1/2	536	120	0.670	0.422	0.248	0.417	0.253	0.164
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.555	0.424	0.131	0.341	0.254	0.086
	r	8x6x1/2	538	120	0.555	0.424	0.131	0.341	0.254	0.086
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	0.654	0.458	0.196	0.404	0.275	0.129
	r	8x6x1/2	540	120	0.655	0.459	0.196	0.405	0.275	0.129
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	0.709	0.449	0.260	0.441	0.269	0.172
	r	8x6x7/16	542	120	0.709	0.449	0.260	0.441	0.269	0.172
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	0.725	0.412	0.313	0.454	0.247	0.207
	r	8x6x7/16	544	120	0.725	0.412	0.313	0.454	0.247	0.207
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167						
23	HT l	8x6x7/16	545	120	0.681	0.326	0.355	0.430	0.196	0.234
	r	8x6x7/16	546	120	0.681	0.326	0.355	0.430	0.196	0.234
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163						
24	HT l	8x6x7/16	547	120	0.524	0.209	0.315	0.333	0.125	0.208
	r	8x6x7/16	548	120	0.525	0.210	0.315	0.334	0.126	0.208
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144	0.543	0.524	0.019	0.327	0.314	0.013
	t	5x31/2x5/16	748	144	0.541	0.522	0.019	0.326	0.313	0.013
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
South End	1S	18-I-47	805	78	0.615	0.045	0.570	0.403	0.027	0.376
		18-I-47	806	78						
		18-I-47	807	78						
		18-I-47	808	78	0.793	0.045	0.748	0.521	0.027	0.494
	2S	24-I-74	809	78						
		24-I-74	810	78						
		24-I-74	811	78						
		24-I-74	812	78						
	3S	18-I-70	818	161						
	4S	18-I-70	817	181	0.743	0.017	0.726	0.489	0.010	0.479
	5S	18-I-85	822	43						
	6S	18-I-85	821	161	0.580	0.123	0.457	0.375	0.074	0.302
	7S	18-I-85	820	181	0.632	0.086	0.546	0.412	0.052	0.360
North End	1N	18-I-47	835	78	0.585	0.061	0.524	0.382	0.037	0.346
		18-I-47	836	78						
		18-I-47	837	78						
		18-I-47	838	78						
	2N	24-I-74	859	78	0.671	0.013	0.658	0.442	0.008	0.434
		24-I-74	860	78						
		24-I-74	861	78						
		24-I-74	862	78	0.965	0.013	0.952	0.636	0.008	0.628
	3N	18-I-70	868	161						
	4N	18-I-70	867	181						
	5N	18-I-85	873	43						
	6N	18-I-85	872	161	0.556	0.098	0.458	0.361	0.059	0.302
	7N	18-I-85	871	181	0.790	0.086	0.704	0.516	0.052	0.465
Total Overstressed Members					2			0		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.5. Hangars 43 and 47 Truss T1 Average Wind, Compression.

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT l	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	1.605	1.407	0.198	0.867	0.737	0.131
	b	5x31/2x5/16	702	144	1.000	1.328	1.821	1.636	0.185	0.979	0.857	0.122
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163	1.000	1.378	0.609	0.609	0.000	0.318	0.318	0.000
2	HT l	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240								
2	D t	5x3x5/16	703	145	1.000	1.091	1.341	1.234	0.107	0.714	0.644	0.071
	b	5x3x5/16	704	145	1.000	1.091	1.299	1.195	0.104	0.692	0.623	0.069
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167	1.000	1.378	0.568	0.568	0.000	0.296	0.296	0.000
3	HT l	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	0.943	0.750	0.193	0.519	0.391	0.127
3	D t	31/2x21/2x5/16	705	146			4.218			0.683		
	b	31/2x21/2x5/16	706	146			2.253			0.639		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170								
4	HT l	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.329	0.985	0.344	0.741	0.514	0.227
4	D t	3x21/2x5/16	707	147	1.000	0.937	1.079	0.760	0.319	0.607	0.397	0.211
	b	3x21/2x5/16	708	147	1.000	0.937	0.925	0.683	0.242	0.516	0.356	0.160
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173								
5	HT l	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	1.011	0.820	0.191	0.554	0.428	0.126
5	D t	3x2x5/16	709	148								
	b	3x2x5/16	710	148								
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT l	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	1.013	0.809	0.204	0.557	0.422	0.135
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			N0 FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.723	0.573	0.150	0.398	0.299	0.099
7	D b	4x3x5/16	713	151	1.000	1.168	0.989	0.751	0.238	0.549	0.392	0.157
	t	4x3x5/16	714	151	1.000	1.168	1.070	0.806	0.264	0.595	0.421	0.174
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	0.960	0.960	0.000	0.501	0.501	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240								
8	D b	3x2x5/16	715	152			fa>Fe			0.936		
	t	3x2x5/16	716	152			fa>Fe			0.940		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	1.457	1.457	0.000	0.760	0.760	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240			fa>Fe			0.950		
9	D b	31/2x21/2x5/16	717	153			fa>Fe			0.947		
	t	31/2x21/2x5/16	718	153								
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.339	1.339	0.000	0.699	0.699	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			0.986		
	t	4x3x5/16	720	154			fa>Fe			0.985		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.302	1.302	0.000	0.679	0.679	0.000
11	HT l	8x6x7/16	521	120								
	r	8x6x7/16	522	120								
11	HB	6x6x3/8	561	240	1.000	1.879	0.575	0.480	0.095	0.313	0.250	0.063
11	D b	5x3x5/16	721	155			2.591			1.004		
	t	5x3x5/16	722	155			2.585			0.975		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.337	1.337	0.000	0.698	0.698	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	0.701	0.239	0.462	0.438	0.133	0.305
	r	8x6x7/16	524	120	1.000	2.562	0.552	0.240	0.312	0.339	0.133	0.206
12	HB	6x6x3/8	562	240	1.000	1.879	0.840	0.713	0.127	0.456	0.372	0.084
12	D b	5x31/2x5/16	723	156			4.040			0.408		
	t	5x31/2x5/16	724	156			4.797			0.411		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.539	0.298	0.241	0.325	0.166	0.159
	r	8x6x7/16	526	120	1.000	2.562	0.689	0.241	0.448	0.430	0.134	0.296
13	HB	6x6x3/8	563	240	1.000	1.879	0.855	0.713	0.142	0.466	0.372	0.094
13	D t	5x31/2x5/16	725	156			2.202			0.358		
	b	5x31/2x5/16	726	156			2.100			0.352		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.811	1.811	0.000	0.945	0.945	0.000
14	HT l	8x6x7/16	527	120								
	r	8x6x7/16	528	120								
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			2.038			0.881		
	b	5x3x5/16	728	155			2.026			0.877		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.724	1.724	0.000	0.899	0.899	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			0.904		
	b	4x3x5/16	730	154			fa>Fe			0.895		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.966	1.966	0.000	1.026	1.026	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			0.822		
	b	31/2x21/2x5/16	732	153			fa>Fe			0.811		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.967	1.967	0.000	1.026	1.026	0.000
17	HT l	8x6x1/2	533	120	1.000	2.562	0.523	0.322	0.201	0.312	0.179	0.133
	r	8x6x1/2	534	120	1.000	2.562	0.523	0.322	0.201	0.312	0.179	0.133
17	HB	6x6x1/2	567	240								
17	D t	3x2x5/16	733	152			fa>Fe			0.823		
	b	3x2x5/16	734	152			fa>Fe			0.799		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	1.293	1.293	0.000	0.675	0.675	0.000
18	HT l	8x6x1/2	535	120	1.000	2.562	0.510	0.370	0.140	0.298	0.206	0.092
	r	8x6x1/2	536	120	1.000	2.562	0.511	0.371	0.140	0.299	0.206	0.092
18	HB	6x6x1/2	568	240								
18	D t	4x3x5/16	735	151	1.000	1.272	0.777	0.613	0.164	0.428	0.320	0.108
	b	4x3x5/16	736	151	1.000	1.272	0.708	0.556	0.152	0.391	0.290	0.100
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	K	r	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	0.566	0.456	0.110	0.311	0.238	0.073
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120								
	r	8x6x1/2	540	120								
20	HB	6x6x1/2	570	240	1.000	1.861	0.542	0.442	0.100	0.297	0.231	0.066
20	D b	3x2x5/16	739	148								
	t	3x2x5/16	740	148								
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173								
21	HT l	8x6x7/16	541	120	1.000	2.562	0.555	0.381	0.174	0.327	0.212	0.115
	r	8x6x7/16	542	120	1.000	2.562	0.555	0.381	0.174	0.327	0.212	0.115
21	HB	6x6x3/8	571	240	1.000	1.879	0.614	0.499	0.115	0.336	0.260	0.076
21	D b	3x21/2x5/16	741	147	1.000	0.937	0.618	0.485	0.133	0.341	0.253	0.088
	t	3x21/2x5/16	742	147	1.000	0.937	0.734	0.573	0.161	0.405	0.299	0.106
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.141	1.141	0.000	0.595	0.595	0.000
22	HT l	8x6x7/16	543	120	1.000	2.562	0.527	0.334	0.193	0.313	0.186	0.127
	r	8x6x7/16	544	120	1.000	2.562	0.527	0.334	0.193	0.313	0.186	0.127
22	HB	6x6x3/8	572	240								
22	D b	31/2x21/2x5/16	743	146	1.000	0.966	1.314	0.963	0.351	0.734	0.502	0.232
	t	31/2x21/2x5/16	744	146	1.000	0.966	1.433	1.019	0.414	0.805	0.532	0.273
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.263	1.263	0.000	0.659	0.659	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	0.899	0.835	0.064	0.478	0.436	0.042
	t	5x3x5/16	746	145	1.000	1.091	0.925	0.860	0.065	0.492	0.449	0.043
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.345	1.345	0.000	0.702	0.702	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	0.980	0.896	0.084	0.525	0.469	0.055
	t	5x31/2x5/16	748	144	1.000	1.328	1.015	0.929	0.086	0.543	0.486	0.057
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
South End	1S	18-I-47	805	78								
		18-I-47	806	78								
		18-I-47	807	78								
		18-I-47	808	78								
	2S	24-I-74	809	78	1.000	9.542	0.666	0.026	0.640	0.438	0.015	0.422
		24-I-74	810	78								
		24-I-74	811	78								
		24-I-74	812	78	1.000	9.542	1.013	0.026	0.987	0.667	0.015	0.651
	3S	18-I-70	818	161								
	4S	18-I-70	817	181								
	5S	18-I-85	822	43								
	6S	18-I-85	821	161								
	7S	18-I-85	820	181	1.000	7.723	0.632	0.086	0.546	0.410	0.050	0.360
North End	1N	18-I-47	835	78	1.000	7.262	0.727	0.056	0.671	0.476	0.033	0.443
		18-I-47	836	78								
		18-I-47	837	78								
		18-I-47	838	78	1.000	7.262	0.729	0.056	0.673	0.477	0.033	0.444
	2N	24-I-74	859	78								
		24-I-74	860	78								
		24-I-74	861	78								
		24-I-74	862	78								
	3N	18-I-70	868	161	1.000	7.485	0.520	0.025	0.495	0.341	0.014	0.327
	4N	18-I-70	867	181	1.000	7.485	0.883	0.086	0.797	0.576	0.049	0.526
	5N	18-I-85	873	43								
	6N	18-I-85	872	161	1.000	2.611	0.556	0.098	0.458	0.356	0.053	0.302
	7N	18-I-85	871	181	1.000	7.723	0.643	0.078	0.565	0.418	0.045	0.373
Total Overstressed Members							47			3		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

All Sections are Double Angles Unless Otherwise Noted

Table 5.6. Hangars 44 and 45 Truss T1 Maximum Wind, Tension.

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160						
1	HT l	8x6x7/16	501	120	0.844	0.335	0.508	0.536	0.201	0.335
	r	8x6x7/16	502	120	0.843	0.335	0.508	0.536	0.201	0.335
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.687	0.687	0.000	0.412	0.412	0.000
2	HT l	8x6x7/16	503	120	1.098	0.537	0.560	0.692	0.322	0.370
	r	8x6x7/16	504	120	1.097	0.537	0.560	0.692	0.322	0.370
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167	0.505	0.505	0.000	0.303	0.303	0.000
3	HT l	8x6x7/16	505	120	1.152	0.675	0.477	0.720	0.405	0.315
	r	8x6x7/16	506	120	1.151	0.675	0.477	0.720	0.405	0.315
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/1	705	146						
	b	31/2x21/2x5/1	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	1.141	0.742	0.399	0.709	0.445	0.263
	r	8x6x7/16	508	120	1.141	0.742	0.399	0.709	0.445	0.263
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	1.018	0.748	0.270	0.627	0.449	0.178
	r	8x6x1/2	510	120	1.017	0.748	0.270	0.627	0.449	0.178
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.878	0.691	0.187	0.538	0.415	0.123
	r	8x6x1/2	512	120	0.878	0.691	0.387	0.670	0.415	0.255
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	1.074	0.687	0.387	0.668	0.412	0.255
	r	8x6x1/2	514	120	1.073	0.687	0.387	0.668	0.412	0.255
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	1.146	0.569	0.577	0.722	0.341	0.381
	r	8x6x1/2	516	120	1.145	0.568	0.577	0.722	0.341	0.381
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187	0.624	0.624	0.000	0.374	0.374	0.000
9	HT l	8x6x7/16	517	120	1.018	0.398	0.620	0.648	0.239	0.409
	r	8x6x7/16	518	120	1.017	0.397	0.620	0.647	0.238	0.409
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/1	717	153						
	t	31/2x21/2x5/1	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.772	0.772	0.000	0.463	0.463	0.000
10	HT l	8x6x7/16	519	120	0.789	0.179	0.610	0.510	0.107	0.403
	r	8x6x7/16	520	120	0.788	0.178	0.610	0.509	0.107	0.403
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193	0.728	0.728	0.000	0.437	0.437	0.000
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.968	0.893	0.075	0.585	0.536	0.050
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.855	0.855	0.000	0.513	0.513	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.520	1.455	0.065	0.916	0.873	0.043
12	D b	5x31/2x5/16	723	156						
	t	5x31/2x5/16	724	156						
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			N0 FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200	0.739	0.739	0.000	0.443	0.443	0.000
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.520	1.455	0.065	0.916	0.873	0.043
13	D t	5x31/2x5/16	725	156						
	b	5x31/2x5/16	726	156						
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.855	0.855	0.000	0.513	0.513	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.968	0.893	0.075	0.585	0.536	0.050
14	D t	5x3x5/16	727	155						
	b	5x3x5/16	728	155						
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193	0.728	0.728	0.000	0.437	0.437	0.000
15	HT l	8x6x7/16	529	120	0.788	0.178	0.610	0.509	0.107	0.403
	r	8x6x7/16	530	120	0.789	0.179	0.610	0.510	0.107	0.403
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190	0.772	0.772	0.000	0.463	0.463	0.000
16	HT l	8x6x7/16	531	120	1.017	0.397	0.620	0.647	0.238	0.409
	r	8x6x7/16	532	120	1.018	0.398	0.620	0.648	0.239	0.409
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/1	731	153						
	b	31/2x21/2x5/1	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187	0.624	0.624	0.000	0.374	0.374	0.000
17	HT l	8x6x1/2	533	120	1.145	0.568	0.577	0.722	0.341	0.381
	r	8x6x1/2	534	120	1.146	0.569	0.577	0.722	0.341	0.381
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	1.073	0.687	0.387	0.668	0.412	0.255
	r	8x6x1/2	536	120	1.074	0.687	0.387	0.668	0.412	0.255
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.878	0.691	0.187	0.538	0.415	0.123
	r	8x6x1/2	538	120	0.878	0.691	0.870	0.989	0.415	0.574
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	1.017	0.748	0.270	0.627	0.449	0.178
	r	8x6x1/2	540	120	1.018	0.748	0.270	0.627	0.449	0.178
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	1.140	0.742	0.399	0.709	0.445	0.263
	r	8x6x7/16	542	120	1.141	0.742	0.399	0.709	0.445	0.263
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	1.151	0.675	0.477	0.720	0.405	0.315
	r	8x6x7/16	544	120	1.152	0.675	0.477	0.720	0.405	0.315
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/1	743	146						
	t	31/2x21/2x5/1	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167	0.505	0.505	0.000	0.303	0.303	0.000
23	HT l	8x6x7/16	545	120	1.097	0.537	0.560	0.692	0.322	0.370
	r	8x6x7/16	546	120	1.098	0.537	0.560	0.692	0.322	0.370
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163	0.687	0.687	0.000	0.412	0.412	0.000
24	HT l	8x6x7/16	547	120	0.843	0.335	0.508	0.536	0.201	0.335
	r	8x6x7/16	548	120	0.844	0.335	0.508	0.536	0.201	0.335
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144						
	t	5x31/2x5/16	748	144						
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
South End	7S	18-I-85	820	289	0.955	0.194	0.761	0.619	0.116	0.502
North End	1N	18-I-47	835	78	1.275	0.075	1.197	0.835	0.045	0.790
		18-I-47	836	78	0.689	0.075	0.614	0.450	0.045	0.405
		18-I-47	837	78	0.541	0.075	0.466	0.353	0.045	0.308
		18-I-47	838	78	1.038	0.075	0.963	0.681	0.045	0.636
	2N	24-I-74	859	78	1.389	0.022	1.368	0.916	0.013	0.903
		24-I-74	860	78	0.857	0.022	0.835	0.564	0.013	0.551
		24-I-74	861	78	0.695	0.022	0.673	0.457	0.013	0.444
		24-I-74	862	78	1.671	0.022	1.649	1.102	0.013	1.088
	3N	18-I-70	868	161	0.964	0.047	0.917	0.633	0.028	0.605
	4N	18-I-70	867	181	1.509	0.085	1.424	0.991	0.051	0.940
	5N	18-I-85	873	43	0.631	0.172	0.460	0.407	0.103	0.304
	6N	18-I-85	872	161	0.683	0.141	0.543	0.443	0.085	0.358
	7N	18-I-85	871	181	1.410	0.156	1.254	0.921	0.094	0.828
Total Overstressed Members					36			1		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.7. Hangars 44 and 45 Truss T1 Maximum Wind, Compression.

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT t	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	1.944	1.614	0.330	1.063	0.845	0.218
	b	5x31/2x5/16	702	144	1.000	1.328	1.876	1.574	0.302	1.023	0.824	0.199
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163	1.552	1.378	1.037	1.037	0.000	0.541	0.541	0.000
2	HT t	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240	1.000	1.879	0.639	0.498	0.141	0.353	0.260	0.093
2	D t	5x3x5/16	703	145	1.000	1.091	1.620	1.467	0.153	0.866	0.765	0.101
	b	5x3x5/16	704	145	1.000	1.091	1.590	1.441	0.149	0.850	0.752	0.098
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167	1.769	1.378	1.020	1.020	0.000	0.532	0.532	0.000
3	HT t	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	1.107	0.867	0.239	0.610	0.452	0.158
3	D t	31/2x21/2x5/16	705	146			fa>Fe			0.858		
	b	31/2x21/2x5/16	706	146			fa>Fe			0.825		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170	1.933	1.378	0.803	0.803	0.000	0.419	0.419	0.000
4	HT t	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.737	1.122	0.615	0.991	0.585	0.406
4	D t	3x21/2x5/16	707	147			46.280			0.501		
	b	3x21/2x5/16	708	147			1.656			0.449		
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173								
5	HT t	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	1.278	0.968	0.310	0.710	0.505	0.205
5	D t	3x2x5/16	709	148								
	b	3x2x5/16	710	148								
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT t	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	1.318	0.973	0.345	0.735	0.508	0.228
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.892	0.677	0.215	0.495	0.353	0.142
7	D b	4x3x5/16	713	151	1.000	1.168	1.432	0.963	0.469	0.812	0.502	0.310
	t	4x3x5/16	714	151	1.000	1.168	1.634	1.038	0.596	0.935	0.542	0.393
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	1.339	1.339	0.000	0.699	0.699	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240	1.000	1.861	0.539	0.387	0.152	0.302	0.202	0.100
8	D b	3x2x5/16	715	152			fa>Fe			1.277		
	t	3x2x5/16	716	152			fa>Fe			1.301		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	2.089	2.089	0.000	1.090	1.090	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			1.389		
	t	31/2x21/2x5/16	718	153			fa>Fe			1.395		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.868	1.868	0.000	0.975	0.975	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			1.447		
	t	4x3x5/16	720	154			fa>Fe			1.447		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.698	1.698	0.000	0.886	0.886	0.000
11	HT l	8x6x7/16	521	120	1.000	2.562	0.767	0.101	0.666	0.496	0.056	0.440
	r	8x6x7/16	522	120	1.000	2.562	0.801	0.102	0.700	0.519	0.057	0.462
11	HB	6x6x3/8	561	240	1.000	1.879	0.622	0.524	0.098	0.338	0.273	0.065
11	D b	5x3x5/16	721	155			fa>Fe			1.506		
	t	5x3x5/16	722	155			fa>Fe			1.497		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.671	1.671	0.000	0.872	0.872	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	1.181	0.440	0.741	0.734	0.245	0.489
	r	8x6x7/16	524	120	1.000	2.562	0.931	0.440	0.491	0.569	0.245	0.324
12	HB	6x6x3/8	562	240	1.000	1.879	0.882	0.750	0.132	0.478	0.391	0.087
12	D b	5x31/2x5/16	723	156			fa>Fe			0.554		
	t	5x31/2x5/16	724	156			fa>Fe			0.562		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.931	0.440	0.000	0.245	0.245	0.000
	r	8x6x7/16	526	120	1.000	2.562	1.181	0.440	0.741	0.734	0.245	0.489
13	HB	6x6x3/8	563	240	1.000	1.879	0.898	0.750	0.148	0.489	0.391	0.098
13	D t	5x31/2x5/16	725	156			fa>Fe			0.562		
	b	5x31/2x5/16	726	156			fa>Fe			0.554		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.790	1.790	0.000	0.934	0.934	0.000
14	HT l	8x6x7/16	527	120	1.000	2.562	0.801	0.102	0.700	0.519	0.057	0.462
	r	8x6x7/16	528	120	1.000	2.562	0.767	0.101	0.666	0.496	0.056	0.440
14	HB	6x6x3/8	564	240	1.000	1.879	0.501	0.405	0.096	0.275	0.211	0.063
14	D t	5x3x5/16	727	155			fa>Fe			1.497		
	b	5x3x5/16	728	155			fa>Fe			1.506		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.698	1.698	0.000	0.886	0.886	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			1.447		
	b	4x3x5/16	730	154			fa>Fe			1.447		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.930	1.930	0.000	1.007	1.007	0.000
16	HT l	8x6x7/16	531	120	1.000	2.562	0.536	0.296	0.240	0.323	0.164	0.158
	r	8x6x7/16	532	120	1.000	2.562	0.536	0.296	0.240	0.323	0.164	0.158
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			1.395		
	b	31/2x21/2x5/16	732	153			fa>Fe			1.389		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.926	1.926	0.000	1.005	1.005	0.000
17	HT l	8x6x1/2	533	120	1.000	2.562	0.560	0.357	0.203	0.332	0.198	0.134
	r	8x6x1/2	534	120	1.000	2.562	0.560	0.357	0.203	0.332	0.198	0.134
17	HB	6x6x1/2	567	240	1.000	1.861	0.539	0.387	0.152	0.302	0.202	0.100
17	D t	3x2x5/16	733	152			fa>Fe			1.301		
	b	3x2x5/16	734	152			fa>Fe			1.277		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	1.232	1.232	0.000	0.643	0.643	0.000
18	HT l	8x6x1/2	535	120	1.000	2.562	0.544	0.401	0.143	0.317	0.223	0.094
	r	8x6x1/2	536	120	1.000	2.562	0.544	0.401	0.143	0.317	0.223	0.094
18	HB	6x6x1/2	568	240								
18	D t	4x3x5/16	735	151	1.000	1.272	1.634	1.038	0.596	0.935	0.542	0.393
	b	4x3x5/16	736	151	1.000	1.272	1.432	0.963	0.469	0.812	0.503	0.310
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	1.318	0.973	0.345	0.735	0.508	0.228
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120	1.000	2.562	0.527	0.413	0.114	0.305	0.230	0.075
	r	8x6x1/2	540	120	1.000	2.562	0.527	0.413	0.114	0.305	0.230	0.075
20	HB	6x6x1/2	570	240	1.000	1.861	1.278	0.968	0.310	0.710	0.505	0.205
20	D b	3x2x5/16	739	148								
	t	3x2x5/16	740	148								
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173	2.278	1.670	0.545	0.545	0.000	0.284	0.284	0.000
21	HT l	8x6x7/16	541	120	1.000	2.562	0.594	0.401	0.192	0.350	0.223	0.127
	r	8x6x7/16	542	120	1.000	2.562	0.594	0.402	0.192	0.350	0.223	0.127
21	HB	6x6x3/8	571	240	1.000	1.879	1.737	1.122	0.615	0.991	0.585	0.406
21	D b	3x21/2x5/16	741	147			1.656			0.449		
	t	3x21/2x5/16	742	147			46.244			0.501		
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.256	1.256	0.000	0.655	0.655	0.000
22	HT l	8x6x7/16	543	120	1.000	2.562	0.560	0.350	0.210	0.333	0.194	0.139
	r	8x6x7/16	544	120	1.000	2.562	0.560	0.350	0.210	0.333	0.194	0.139
22	HB	6x6x3/8	572	240	1.000	1.879	1.050	0.816	0.234	0.580	0.426	0.154
22	D b	31/2x21/2x5/16	743	146			fa>Fe			0.825		
	t	31/2x21/2x5/16	744	146			fa>Fe			0.858		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.357	1.357	0.000	0.708	0.708	0.000
23	HT l	8x6x7/16	545	120	1.000	2.562	0.523	0.273	0.249	0.316	0.152	0.164
	r	8x6x7/16	546	120	1.000	2.562	0.523	0.274	0.249	0.317	0.152	0.164
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.590	1.441	0.149	0.850	0.752	0.098
	t	5x3x5/16	746	145	1.000	1.091	1.620	1.467	0.153	0.866	0.765	0.101
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.414	1.414	0.000	0.738	0.738	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	1.876	1.574	0.302	1.023	0.824	0.199
	t	5x31/2x5/16	748	144	1.000	1.328	1.944	1.614	0.330	1.063	0.845	0.218
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South	7S	18-I-85	820	384	1.000	7.723	0.529	0.016	0.513	0.347	0.009	0.339
North End	1N	18-I-47	835	78	1.000	7.262	1.407	0.099	1.308	0.922	0.058	0.863
		18-I-47	836	78	1.000	7.262	0.815	0.099	0.716	0.531	0.058	0.473
		18-I-47	837	78	1.000	7.262	0.653	0.099	0.554	0.424	0.058	0.366
		18-I-47	838	78	1.000	7.262	1.331	0.099	1.232	0.871	0.058	0.813
	2N	24-I-74	859	78	1.000	9.542	1.874	0.037	1.837	1.234	0.022	1.212
		24-I-74	860	78	1.000	9.542	0.825	0.037	0.788	0.542	0.022	0.520
		24-I-74	861	78	1.000	9.542	0.905	0.037	0.868	0.595	0.022	0.573
		24-I-74	862	78	1.000	9.542	1.511	0.037	1.474	0.995	0.022	0.973
	3N	18-I-70	868	161	1.000	7.485	0.884	0.044	0.840	0.580	0.025	0.554
	4N	18-I-70	867	181	1.000	7.485	1.530	0.148	1.383	0.998	0.085	0.913
	5N	18-I-85	873	43	1.000	2.611	0.597	0.101	0.496	0.386	0.059	0.327
	6N	18-I-85	872	161								
	7N	18-I-85	871	181	1.000	7.723	1.765	0.173	1.593	1.151	0.100	1.051
Total Overstressed Members							72			25		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.8. Hangars 44 and 45 Truss T1 Average Wind, Tension.

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18-I-85	576	160						
1	HT l	8x6x7/16	501	120	0.685	0.257	0.428	0.437	0.154	0.282
	r	8x6x7/16	502	120	0.684	0.256	0.428	0.436	0.154	0.282
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.577	0.577	0.000	0.346	0.346	0.000
2	HT l	8x6x7/16	503	120	0.871	0.418	0.453	0.550	0.251	0.299
	r	8x6x7/16	504	120	0.870	0.417	0.453	0.549	0.250	0.299
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167						
3	HT l	8x6x7/16	505	120	0.878	0.516	0.362	0.549	0.310	0.239
	r	8x6x7/16	506	120	0.878	0.516	0.362	0.549	0.310	0.239
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	0.824	0.533	0.291	0.512	0.320	0.192
	r	8x6x7/16	508	120	0.824	0.533	0.291	0.512	0.320	0.192
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	0.741	0.539	0.202	0.457	0.323	0.133
	r	8x6x1/2	510	120	0.741	0.539	0.202	0.457	0.323	0.133
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.644	0.502	0.142	0.395	0.301	0.094
	r	8x6x1/2	512	120	0.643	0.501	0.142	0.394	0.301	0.094
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	0.775	0.479	0.296	0.483	0.287	0.195
	r	8x6x1/2	514	120	0.774	0.478	0.296	0.482	0.287	0.195
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	0.827	0.420	0.407	0.521	0.252	0.269
	r	8x6x1/2	516	120	0.826	0.419	0.407	0.520	0.251	0.269
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187						
9	HT l	8x6x7/16	517	120	0.740	0.304	0.436	0.470	0.182	0.288
	r	8x6x7/16	518	120	0.739	0.303	0.436	0.470	0.182	0.288
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.539	0.539	0.000	0.323	0.323	0.000
10	HT l	8x6x7/16	519	120	0.586	0.155	0.431	0.377	0.093	0.284
	r	8x6x7/16	520	120	0.585	0.154	0.431	0.377	0.092	0.284
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193						
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.706	0.645	0.061	0.427	0.387	0.040
11	D b	5x3x5/16	721	155	0.501	0.461	0.040	0.303	0.277	0.026
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.589	0.589	0.000	0.353	0.353	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.123	1.069	0.054	0.677	0.641	0.036
12	D b	5x31/2x5/16	723	156	0.551	0.506	0.045	0.333	0.304	0.030
	t	5x31/2x5/16	724	156	0.553	0.508	0.045	0.335	0.305	0.030
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
13	V	W14x61	588	200	0.505	0.505	0.000	0.303	0.303	0.000
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.083	1.029	0.054	0.653	0.617	0.036
13	D t	5x31/2x5/16	725	156	0.525	0.478	0.047	0.318	0.287	0.031
	b	5x31/2x5/16	726	156	0.523	0.476	0.047	0.317	0.286	0.031
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.589	0.589	0.000	0.353	0.353	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.706	0.645	0.061	0.427	0.387	0.040
14	D t	5x3x5/16	727	155						
	b	5x3x5/16	728	155						
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193						
15	HT l	8x6x7/16	529	120	0.585	0.154	0.431	0.377	0.092	0.284
	r	8x6x7/16	530	120	0.586	0.155	0.431	0.377	0.093	0.284
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190	0.530	0.530	0.000	0.318	0.318	0.000
16	HT l	8x6x7/16	531	120	0.739	0.303	0.436	0.470	0.182	0.288
	r	8x6x7/16	532	120	0.739	0.303	0.436	0.470	0.182	0.288
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187						
17	HT l	8x6x1/2	533	120	0.850	0.430	0.420	0.535	0.258	0.277
	r	8x6x1/2	534	120	0.850	0.430	0.420	0.535	0.258	0.277
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	0.825	0.525	0.300	0.513	0.315	0.198
	r	8x6x1/2	536	120	0.826	0.526	0.300	0.514	0.316	0.198
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.667	0.529	0.138	0.408	0.317	0.091
	r	8x6x1/2	538	120	0.667	0.529	0.138	0.408	0.317	0.091
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	0.772	0.578	0.194	0.475	0.347	0.128
	r	8x6x1/2	540	120	0.772	0.578	0.194	0.475	0.347	0.128
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	0.877	0.583	0.294	0.544	0.350	0.194
	r	8x6x7/16	542	120	0.877	0.583	0.294	0.544	0.350	0.194
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	0.929	0.540	0.389	0.581	0.324	0.257
	r	8x6x7/16	544	120	0.930	0.541	0.389	0.581	0.325	0.257
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167						
23	HT l	8x6x7/16	545	120	0.912	0.434	0.478	0.576	0.260	0.315
	r	8x6x7/16	546	120	0.912	0.434	0.478	0.576	0.260	0.315
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163	0.598	0.598	0.000	0.359	0.359	0.000
24	HT l	8x6x7/16	547	120	0.709	0.265	0.444	0.452	0.159	0.293
	r	8x6x7/16	548	120	0.709	0.265	0.444	0.452	0.159	0.293
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144						
	t	5x31/2x5/16	748	144						
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
South End	7S	18-I-85	820	289		0.134	0.761			
North End	1N	18-I-47	835	78	1.272	0.075	1.197	0.835	0.045	0.790
		18-I-47	836	78	0.689	0.075	0.614	0.450	0.045	0.405
		18-I-47	837	78	0.541	0.075	0.466	0.353	0.045	0.308
		18-I-47	838	78	1.038	0.075	0.963	0.681	0.045	0.636
	2N	24-I-74	859	78	1.390	0.022	1.368	0.916	0.013	0.903
		24-I-74	860	78	0.857	0.022	0.835	0.564	0.013	0.551
		24-I-74	861	78	0.695	0.022	0.673	0.457	0.013	0.444
		24-I-74	862	78	1.671	0.022	1.649	1.102	0.013	1.088
	3N	18-I-70	868	161	0.687	0.027	0.660	0.452	0.016	0.436
	4N	18-I-70	867	181	1.509	0.085	1.424	0.991	0.051	0.940
	5N	18-I-85	873	43	0.632	0.172	0.460	0.407	0.103	0.304
	6N	18-I-85	872	161	0.684	0.141	0.543	0.443	0.085	0.358
	7N	18-I-85	871	181	1.410	0.156	1.254	0.921	0.094	0.828
Total Overstressed Members					8			1		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.9. Hangars 44 and 45 Truss T1 Average Wind, Compression.

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT l	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	1.548	1.366	0.182	0.835	0.715	0.120
	b	5x31/2x5/16	702	144	1.000	1.328	1.489	1.319	0.170	0.803	0.691	0.112
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163	1.552	1.378	1.067	1.067	0.000	0.557	0.557	0.000
2	HT l	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240	1.000	1.879	0.639	0.498	0.141	0.353	0.260	0.093
2	D t	5x3x5/16	703	145	1.000	1.091	1.287	1.187	0.100	0.685	0.619	0.066
	b	5x3x5/16	704	145	1.000	1.091	1.241	1.144	0.097	0.661	0.597	0.064
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167	1.769	1.378	1.072	1.072	0.000	0.559	0.559	0.000
3	HT l	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	1.106	0.867	0.239	0.610	0.452	0.158
3	D t	31/2x21/2x5/16	705	146			2.313			0.725		
	b	31/2x21/2x5/16	706	146	1.000	0.966	1.732	1.098	0.634	0.991	0.573	0.418
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170	1.933	1.378	0.867	0.867	0.000	0.452	0.452	0.000
4	HT l	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.535	1.085	0.450	0.863	0.566	0.297
4	D t	3x21/2x5/16	707	147	1.000	0.937	0.969	0.711	0.258	0.541	0.371	0.170
	b	3x21/2x5/16	708	147	1.000	0.937	0.832	0.630	0.202	0.462	0.329	0.133
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173								
5	HT l	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	1.097	0.883	0.214	0.602	0.461	0.141
5	D t	3x2x5/16	709	148								
	b	3x2x5/16	710	148								
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT l	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	1.075	0.860	0.215	0.591	0.449	0.142
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.751	0.595	0.156	0.413	0.310	0.103
7	D b	4x3x5/16	713	151	1.000	1.168	1.098	0.824	0.274	0.611	0.430	0.181
	t	4x3x5/16	714	151	1.000	1.168	1.189	0.879	0.310	0.663	0.459	0.205
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	1.232	1.232	0.000	0.643	0.643	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240								
8	D b	3x2x5/16	715	152			fa>Fe			0.994		
	t	3x2x5/16	716	152			fa>Fe			1.000		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	1.968	1.968	0.000	1.027	1.027	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			1.125		
	t	31/2x21/2x5/16	718	153			fa>Fe			1.121		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.748	1.748	0.000	0.912	0.912	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			1.032		
	t	4x3x5/16	720	154			fa>Fe			1.029		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.609	1.609	0.000	0.839	0.839	0.000
11	HT l	8x6x7/16	521	120	1.000	2.562	0.548	0.112	0.436	0.350	0.062	0.288
	r	8x6x7/16	522	120	1.000	2.562	0.566	0.112	0.454	0.362	0.062	0.300
11	HB	6x6x3/8	561	240	1.000	1.879	0.508	0.423	0.085	0.277	0.221	0.056
11	D b	5x3x5/16	721	155			2.776			1.032		
	t	5x3x5/16	722	155			2.764			1.030		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.595	1.595	0.000	0.832	0.832	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	0.814	0.340	0.474	0.502	0.189	0.313
	r	8x6x7/16	524	120	1.000	2.562	0.651	0.340	0.311	0.394	0.189	0.205
12	HB	6x6x3/8	562	240	1.000	1.879	0.744	0.635	0.109	0.403	0.331	0.072
12	D b	5x31/2x5/16	723	156			5.763			0.416		
	t	5x31/2x5/16	724	156			8.410			0.421		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.644	0.362	0.282	0.387	0.201	0.186
	r	8x6x7/16	526	120	1.000	2.562	0.795	0.362	0.433	0.487	0.201	0.286
13	HB	6x6x3/8	563	240	1.000	1.879	0.696	0.635	0.061	0.372	0.331	0.040
13	D t	5x31/2x5/16	725	156			8.410			0.421		
	b	5x31/2x5/16	726	156			5.763			0.416		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.389	1.389	0.000	0.725	0.725	0.000
14	HT l	8x6x7/16	527	120	1.000	2.562	0.578	0.156	0.422	0.365	0.087	0.279
	r	8x6x7/16	528	120	1.000	2.562	0.555	0.156	0.399	0.350	0.087	0.263
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			2.764			1.030		
	b	5x3x5/16	728	155			2.776			1.032		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.394	1.394	0.000	0.727	0.727	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			1.018		
	b	4x3x5/16	730	154			fa>Fe			1.015		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.515	1.515	0.000	0.790	0.790	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			1.079		
	b	31/2x21/2x5/16	732	153			fa>Fe			1.083		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.673	1.673	0.000	0.873	0.873	0.000
17	HT l	8x6x1/2	533	120								
	r	8x6x1/2	534	120								
17	HB	6x6x1/2	567	240								
17	D t	3x2x5/16	733	152			fa>Fe			0.999		
	b	3x2x5/16	734	152			fa>Fe			0.947		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	1.004	1.004	0.000	0.524	0.524	0.000
18	HT l	8x6x1/2	535	120								
	r	8x6x1/2	536	120								
18	HB	6x6x1/2	568	240	1.000	1.861	0.624	0.491	0.133	0.344	0.256	0.088
18	D t	4x3x5/16	735	151	1.000	1.272	1.093	0.820	0.273	0.608	0.428	0.180
	b	4x3x5/16	736	151	1.000	1.272	1.011	0.765	0.246	0.562	0.399	0.162
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	0.914	0.733	0.181	0.502	0.382	0.119
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120								
	r	8x6x1/2	540	120								
20	HB	6x6x1/2	570	240	1.000	1.861	0.909	0.743	0.166	0.497	0.388	0.110
20	D b	3x2x5/16	739	148								
	t	3x2x5/16	740	148								
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173	2.278	1.670	0.619	0.619	0.000	0.323	0.323	0.000
21	HT l	8x6x7/16	541	120								
	r	8x6x7/16	542	120								
21	HB	6x6x3/8	571	240	1.000	1.879	1.157	0.885	0.272	0.641	0.462	0.180
21	D b	3x21/2x5/16	741	147	1.000	0.937	0.832	0.630	0.202	0.462	0.329	0.133
	t	3x21/2x5/16	742	147	1.000	0.937	0.969	0.711	0.258	0.541	0.371	0.170
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.016	1.016	0.000	0.530	0.530	0.000
22	HT l	8x6x7/16	543	120								
	r	8x6x7/16	544	120								
22	HB	6x6x3/8	572	240	1.000	1.879	0.814	0.649	0.165	0.448	0.339	0.109
22	D b	31/2x21/2x5/16	743	146			2.274			0.720		
	t	31/2x21/2x5/16	744	146			4.264			0.754		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.164	1.164	0.000	0.607	0.607	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.307	1.202	0.105	0.696	0.627	0.069
	t	5x3x5/16	746	145	1.000	1.091	1.348	1.240	0.108	0.718	0.647	0.071
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.118	1.118	0.000	0.583	0.583	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	1.554	1.367	0.187	0.839	0.716	0.123
	t	5x31/2x5/16	748	144	1.000	1.328	1.612	1.412	0.200	0.871	0.739	0.132
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South	7S	18-I-85	820	384	1.000	7.723		0.018	0.513	0.349	0.010	0.339
North End	1N	18-I-47	835	78	1.000	7.262	1.406	0.099	1.307	0.921	0.058	0.863
		18-I-47	836	78	1.000	7.262	0.815	0.099	0.716	0.531	0.058	0.473
		18-I-47	837	78	1.000	7.262	0.652	0.099	0.553	0.423	0.058	0.365
		18-I-47	838	78	1.000	7.262	1.330	0.099	1.231	0.871	0.058	0.812
	2N	24-I-74	859	78	1.000	9.542	1.874	0.037	1.837	1.234	0.022	1.212
		24-I-74	860	78	1.000	9.542	0.824	0.037	0.787	0.541	0.022	0.519
		24-I-74	861	78	1.000	9.542	0.905	0.037	0.868	0.595	0.022	0.573
		24-I-74	862	78	1.000	9.542	1.511	0.037	1.474	0.995	0.022	0.973
	3N	18-I-70	868	161	1.000	7.485	0.884	0.044	0.840	0.580	0.025	0.554
	4N	18-I-70	867	181	1.000	7.485	1.531	0.148	1.383	0.998	0.085	0.913
	5N	18-I-85	873	43	1.000	2.611	0.572	0.076	0.496	0.372	0.044	0.327
	6N	18-I-85	872	161								
	7N	18-I-85	871	181	1.000	7.723	1.742	0.149	1.593	1.137	0.086	1.051
		Total Overstressed Members					61			15		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.10. Hangars 43 and 47 Truss T2, Tension.

						Computed			No FOS *		
	Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
	1	V t	18-I-64	76	118						
		b	18-I-64	50	42						
x	1	HT l	8x6x9/16	1	120						
x		r	8x6x9/16	2	120						
	1	HB	6x6x9/16	51	240						
	1	D t	6x4x3/8	201	134						
		b	6x4x3/8	202	134						
x	1	BV	3x2.5x1/4	101	61						
x	1	BD	3x2x1/4	126	135						
x	2	V	6x4x3/8	77	163						
x	2	HT l	8x6x9/16	3	120						
x		r	8x6x9/16	4	120						
	2	HB	6x6x9/16	52	240						
	2	D t	6x31/2x5/16	203	145						
		b	6x31/2x5/16	204	145						
x	2	BV	3x2.5x1/4	102	83						
x	2	BD	3x2x1/4	127	147						
x	3	V	6x4x3/8	78	167						
x	3	HT l	8x6x9/16	5	120						
x		r	8x6x9/16	6	120						
	3	HB	6x6x9/16	53	240						
x	3	D t	5x3x5/16	205	146						
x		b	5x3x5/16	206	146						
x	3	BV	3x2x1/4	103	85						
x	3	BD	3x2x1/4	128	148						
x	4	V	6x31/2x5/16	79	170						
x	4	HT l	8x6x9/16	7	120						
x		r	8x6x9/16	8	120						
	4	HB	6x6x9/16	54	240						
	4	D t	31/2x21/2x5/16	207	147						
		b	31/2x21/2x5/16	208	147						
x	4	BV	3x2.5x1/4	104	87						
x	4	BD	3x2x1/4	129	149						
x	5	V	6x31/2x5/16	80	173						
x	5	HT l	8x6x5/8	9	120						
x		r	8x6x5/8	10	120						
	5	HB	6x6x11/16	55	240						
	5	D t	3x21/2x5/16	209	148						
		b	3x21/2x5/16	210	148						
x	5	BV	3x2.5x1/4	105	88						
x	5	BD	3x2x1/4	130	150						
x	6	V	6x31/2x5/16	81	177						
x	6	HT l	8x6x5/8	11	120						
x		r	8x6x5/8	12	120						
	6	HB	6x6x11/16	56	240						
x	6	D t	4x3x5/16	211	149						
x		b	4x3x5/16	212	149						
x	6	BV	3x2.5x1/4	106	90						
x	6	BD	3x2x1/4	131	151						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

						Computed			No FOS *		
	Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
x	7	V	6x31/2x5/16	82	180						
x	7	HT l	8x6x5/8	13	120						
x		r	8x6x5/8	14	120						
	7	HB	6x6x11/16	57	240						
x	7	D b	3x2x5/16	213	151						
x		t	3x2x5/16	214	151						
x	7	BV	3x2.5x1/4	107	90						
x	7	BD	3x2x1/4	132	149						
x	8	V	6x31/2x5/16	83	183						
x	8	HT l	8x6x5/8	15	120						
x		r	8x6x5/8	16	120						
	8	HB	6x6x11/16	58	240						
x	8	D b	3x21/2x5/16	215	152						
x		t	3x21/2x5/16	216	152						
x	8	BV	3x2.5x1/4	108	92						
x	8	BD	3x2x1/4	133	150						
x	9	V	6x31/2x5/16	84	187						
x	9	HT l	8x6x9/16	17	120						
x		r	8x6x9/16	18	120						
	9	HB	6x6x9/16	59	240						
x	9	D b	31/2x21/2x5/16	217	153						
x		t	31/2x21/2x5/16	218	153						
x	9	BV	3x2.5x1/4	109	93						
x	9	BD	3x2x1/4	134	151						
x	10	V	6x4x3/8	85	190						
x	10	HT l	8x6x9/16	19	120						
x		r	8x6x9/16	20	120						
	10	HB	6x6x9/16	60	240						
x	10	D b	4x3x5/16	219	154						
x		t	4x3x5/16	220	154						
x	10	BV	3x2.5x1/4	110	95						
x	10	BD	3x2x1/4	135	152						
x	11	V	6x4x3/8	86	193						
x	11	HT l	8x6x9/16	21	120						
x		r	8x6x9/16	22	120						
	11	HB	6x6x9/16	61	240						
x	11	D b	6x31/2x6/16	221	155						
x		t	6x31/2x6/16	222	155						
x	11	BV	3x2.5x1/4	111	97						
x	11	BD	3x2x1/4	136	153						
x	12	V	6x4x7/16	87	197						
x	12	HT l	8x6x9/16	23	120						
x		r	8x6x9/16	24	120						
x	12	HB	6x6x9/16	62	240						
x	12	D b	6x31/2x3/8	223	156						
x		t	6x31/2x3/8	224	156						
x	12	BV	3x2.5x1/4	112	98						
x	12	BD	3x2x1/4	137	154						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

	Bay	Mem.	Section	#	Length	Computed			No FOS *		
						Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
	13	V	14-I-87	88	200						
x	13	HT l	8x6x9/16	25	120						
x		r	8x6x9/16	26	120						
x	13	HB	6x6x9/16	63	240						
x	13	D t	6x31/2x3/8	225	156						
x		b	6x31/2x3/8	226	156						
x	13	BV	3x2.5x1/4	113	98						
x	13	BD	3x2x1/4	138	154						
x	14	V	6x4x7/16	89	197						
x	14	HT l	8x6x9/16	27	120						
x		r	8x6x9/16	28	120						
	14	HB	6x6x9/16	64	240						
x	14	D t	6x31/2x6/16	227	155						
x		b	6x31/2x6/16	228	155						
x	14	BV	3x2.5x1/4	114	97						
x	14	BD	3x2x1/4	139	153						
x	15	V	6x4x3/8	90	193						
x	15	HT l	8x6x9/16	29	120						
x		r	8x6x9/16	30	120						
	15	HB	6x6x9/16	65	240						
x	15	D t	4x3x5/16	229	154						
x		b	4x3x5/16	230	154						
x	15	BV	3x2.5x1/4	115	95						
x	15	BD	3x2x1/4	140	152						
x	16	V	6x4x3/8	91	190						
x	16	HT l	8x6x9/16	31	120						
x		r	8x6x9/16	32	120						
	16	HB	6x6x9/16	66	240						
x	16	D t	31/2x21/2x5/16	231	153						
x		b	31/2x21/2x5/16	232	153						
x	16	BV	3x2.5x1/4	116	93						
x	16	BD	3x2x1/4	141	151						
x	17	V	6x31/2x5/16	92	187						
x	17	HT l	8x6x5/8	33	120						
x		r	8x6x5/8	34	120						
	17	HB	6x6x11/16	67	240						
x	17	D t	3x21/2x5/16	233	152						
x		b	3x21/2x5/16	234	152						
x	17	BV	3x2.5x1/4	117	92						
x	17	BD	3x2x1/4	142	150						
x	18	V	6x31/2x5/16	93	183						
x	18	HT l	8x6x5/8	35	120						
x		r	8x6x5/8	36	120						
	18	HB	6x6x11/16	68	240						
x	18	D t	3x2x5/16	235	151						
x		b	3x2x5/16	236	151						
x	18	BV	3x2.5x1/4	118	90						
x	18	BD	3x2x1/4	143	149						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

						Computed			No FOS *		
	Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
x	19	V	6x31/2x5/16	94	180						
x	19	HT l	8x6x5/8	37	120						
x		r	8x6x5/8	38	120						
	19	HB	6x6x11/16	69	240						
x	19	D b	4x3x5/16	237	149						
x		t	4x3x5/16	238	149						
x	19	BV	3x2.5x1/4	119	90						
x	19	BD	3x2x1/4	144	149						
x	20	V	6x31/2x5/16	95	177						
x	20	HT l	8x6x5/8	39	120						
x		r	8x6x5/8	40	120						
	20	HB	6x6x11/16	70	240						
	20	D b	3x21/2x5/16	239	148						
		t	3x21/2x5/16	240	148						
x	20	BV	3x2.5x1/4	120	88						
x	20	BD	3x2x1/4	145	148						
x	21	V	6x31/2x5/16	96	173						
x	21	HT l	8x6x9/16	41	120						
x		r	8x6x9/16	42	120						
	21	HB	6x6x9/16	71	240						
	21	D b	31/2x21/2x5/16	241	147						
		t	31/2x21/2x5/16	242	147						
x	21	BV	3x2x1/4	121	87						
x	21	BD	3x2x1/4	146	147						
x	22	V	6x31/2x5/16	97	170						
x	22	HT l	8x6x9/16	43	120						
x		r	8x6x9/16	44	120						
	22	HB	6x6x9/16	72	240						
x	22	D b	5x3x5/16	243	146						
x		t	5x3x5/16	244	146						
x	22	BV	3x2.5x1/4	122	85						
x	22	BD	3x2x1/4	147	146						
x	23	V	6x4x3/8	98	167						
x	23	HT l	8x6x9/16	45	120						
x		r	8x6x9/16	46	120						
	23	HB	6x6x9/16	73	240						
x	23	D b	6x31/2x5/16	245	145						
x		t	6x31/2x5/16	246	145						
x	23	BV	3x2.5x1/4	123	83						
x	23	BD	3x2x1/4	148	145						
x	24	V	6x4x3/8	99	163						
x	24	HT l	8x6x9/16	47	120						
x		r	8x6x9/16	48	120						
	24	HB	6x6x9/16	74	240						
x	24	D b	6x4x3/8	247	144						
x		t	6x4x3/8	248	144						
x	24	BV	3x2.5x1/4	124	82						
x	24	BD	3x2x1/4	149	144						
	End	EV t	18-I-64	100	118						
		b	18-I-64	49	42						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

	Bay	Mem.	Section	#	Length	Computed			No FOS *		
						Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
	South End	1S	8-I-17	301	78						
		2S	12-I-23	302	312						
		3S	10-I-21	303	78						
		4S	14-I-30	304	312						
		5S	14-I-30	305	78						
			14-I-30	306	78						
			14-I-30	307	78						
			14-I-30	308	78						
		6S	10-I-21	313	78						
		7S	18-I-47	309	78						
			18-I-47	310	78						
			18-I-47	311	78						
			18-I-47	312	78						
		8S	8-H-31	314	181						
		9S	8-H-31	315	217						
		10S	8-H-31	316	42						
		11S	18-I-47	317	181						
		12S	18-I-47	318	161						
		13S	18-I-47	331	43						
		14S	18-I-47	319	42						
		15S	18-I-64	320	181						
		16S	18-I-64	321	161						
		17S	18-I-64	322	43						
		18S	18-I-64	50	42						
x		19S	31/2x21/2x5/16	323	175						
x			31/2x21/2x5/16	324	175						
x		20S	31/2x21/2x5/16	325	175						
x			31/2x21/2x5/16	326	175						
x		21S	31/2x21/2x5/16	327	180						
x			31/2x21/2x5/16	328	180						
x		22S	31/2x21/2x5/16	329	180						
x			31/2x21/2x5/16	330	180						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

						Computed			No FOS *		
						Stress			Stress		
	Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
	North End	1N	8-I-17	352	78						
		2N	12-I-23	351	312						
		3N	10-I-21	354	78						
		4N	14-I-30	353	312						
		5N	14-I-30	355	78						
			14-I-30	356	78						
			14-I-30	357	78						
			14-I-30	358	78						
		6N	10-I-21	363	78						
		7N	18-I-47	359	78						
			18-I-47	360	78						
			18-I-47	361	78						
			18-I-47	362	78						
		8N	8-H-31	364	181						
		9N	8-H-31	365	217						
		10N	8-H-31	366	42						
		11N	18-I-47	367	181						
		12N	18-I-47	368	161						
		13N	18-I-47	369	43						
		14N	18-I-47	370	42						
		15N	18-I-64	371	181						
		16N	18-I-64	372	161						
		17N	18-I-64	373	43						
		18N	18-I-64	49	42						
x		19N	31/2x21/2x5/16	374	175						
x			31/2x21/2x5/16	375	175						
x		20N	31/2x21/2x5/16	376	175						
x			31/2x21/2x5/16	377	175						
x		21N	31/2x21/2x5/16	378	180						
x			31/2x21/2x5/16	379	180						
x		22N	31/2x21/2x5/16	380	180						
x			31/2x21/2x5/16	381	180						
	Center Column	CC	14-I-87	385	384						
			Total Overstressed Members			0			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.11. Hangars 43 and 47 Truss T2, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
1	V t	18-I-64	76	118								
	b	18-I-64	50	42								
1	HT l	8x6x9/16	1	120								
	r	8x6x9/16	2	120								
1	HB	6x6x9/16	51	240								
1	D t	6x4x3/8	201	134								
	b	6x4x3/8	202	134								
1	BV	3x2.5x1/4	101	61								
1	BD	3x2x1/4	126	135								
2	V	6x4x3/8	77	163								
2	HT l	8x6x9/16	3	120								
	r	8x6x9/16	4	120								
2	HB	6x6x9/16	52	240								
2	D t	6x31/2x5/16	203	145	1.000	1.380	0.536	0.438	0.097	0.294	0.230	0.064
	b	6x31/2x5/16	204	145	1.000	1.380	0.525	0.428	0.097	0.288	0.224	0.064
2	BV	3x2.5x1/4	102	83								
2	BD	3x2x1/4	127	147								
3	V	6x4x3/8	78	167								
3	HT l	8x6x9/16	5	120								
	r	8x6x9/16	6	120								
3	HB	6x6x9/16	53	240								
3	D t	5x3x5/16	205	146	1.000	1.084	0.578	0.483	0.095	0.315	0.252	0.063
	b	5x3x5/16	206	146	1.000	1.084	0.550	0.457	0.094	0.300	0.238	0.062
3	BV	3x2.5x1/4	103	85								
3	BD	3x2x1/4	128	148								
4	V	6x31/2x5/16	79	170								
4	HT l	8x6x9/16	7	120								
	r	8x6x9/16	8	120								
4	HB	6x6x9/16	54	240								
4	D t	31/2x21/2x5/16	207	147								
	b	31/2x21/2x5/16	208	147								
4	BV	3x2.5x1/4	104	87								
4	BD	3x2x1/4	129	149								
5	V	6x31/2x5/16	80	173								
5	HT l	8x6x5/8	9	120								
	r	8x6x5/8	10	120								
5	HB	6x6x11/16	55	240								
5	D t	3x21/2x5/16	209	148								
	b	3x21/2x5/16	210	148								
5	BV	3x2.5x1/4	105	88								
5	BD	3x2x1/4	130	150								
6	V	6x31/2x5/16	81	177								
6	HT l	8x6x5/8	11	120								
	r	8x6x5/8	12	120								
6	HB	6x6x11/16	56	240								
6	D t	4x3x5/16	211	149								
	b	4x3x5/16	212	149								
6	BV	3x2.5x1/4	106	90								
6	BD	3x2x1/4	131	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	82	180								
7	HT l	8x6x5/8	13	120								
	r	8x6x5/8	14	120								
7	HB	6x6x11/16	57	240								
7	D b	3x2x5/16	213	151	1.000	0.767	1.254	1.045	0.209	0.683	0.545	0.138
	t	3x2x5/16	214	151	1.000	0.767	1.386	1.132	0.254	0.758	0.591	0.168
7	BV	3x2.5x1/4	107	90								
7	BD	3x2x1/4	132	149								
8	V	6x31/2x5/16	83	183								
8	HT l	8x6x5/8	15	120								
	r	8x6x5/8	16	120								
8	HB	6x6x11/16	58	240								
8	D b	3x21/2x5/16	215	152			fa>Fe			0.440		
	t	3x21/2x5/16	216	152			fa>Fe			0.447		
8	BV	3x2.5x1/4	108	92								
8	BD	3x2x1/4	133	150								
9	V	6x31/2x5/16	84	187								
9	HT l	8x6x9/16	17	120								
	r	8x6x9/16	18	120								
9	HB	6x6x9/16	59	240								
9	D b	31/2x21/2x5/16	217	153	1.000	0.966	1.713	1.132	0.581	0.974	0.591	0.383
	t	31/2x21/2x5/16	218	153	1.000	0.966	1.752	1.141	0.611	0.999	0.595	0.403
9	BV	3x2.5x1/4	109	93								
9	BD	3x2x1/4	134	151								
10	V	6x4x3/8	85	190								
10	HT l	8x6x9/16	19	120								
	r	8x6x9/16	20	120								
10	HB	6x6x9/16	60	240								
10	D b	4x3x5/16	219	154	1.000	1.168	1.198	0.906	0.292	0.665	0.473	0.193
	t	4x3x5/16	220	154	1.000	1.168	1.210	0.913	0.297	0.672	0.476	0.196
10	BV	3x2.5x1/4	110	95								
10	BD	3x2x1/4	135	152								
11	V	6x4x3/8	86	193								
11	HT l	8x6x9/16	21	120								
	r	8x6x9/16	22	120								
11	HB	6x6x9/16	61	240								
11	D b	6x31/2x6/16	221	155	1.000	1.380	0.732	0.617	0.115	0.399	0.323	0.076
	t	6x31/2x6/16	222	155	1.000	1.380	0.740	0.625	0.115	0.403	0.327	0.076
11	BV	3x2.5x1/4	111	97								
11	BD	3x2x1/4	136	153								
12	V	6x4x7/16	87	197								
12	HT l	8x6x9/16	23	120								
	r	8x6x9/16	24	120								
12	HB	6x6x9/16	62	240	1.000	1.861	0.529	0.435	0.094	0.289	0.227	0.062
12	D b	6x31/2x3/8	223	156	1.000	1.390	0.827	0.708	0.119	0.449	0.370	0.079
	t	6x31/2x3/8	224	156	1.000	1.390	0.846	0.726	0.120	0.459	0.380	0.079
12	BV	3x21/2x1/4	112	98								
12	BD	3x2x1/4	137	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	14-I-87	88	200								
13	HT l	8x6x9/16	25	120								
	r	8x6x9/16	26	120								
13	HB	6x6x9/16	63	240	1.000	1.861	0.533	0.436	0.097	0.291	0.227	0.064
13	D t	6x31/2x3/8	225	156	1.000	1.390	0.846	0.726	0.120	0.459	0.380	0.079
	b	6x31/2x3/8	226	156	1.000	1.390	0.827	0.708	0.119	0.449	0.370	0.079
13	BV	3x21/2x1/4	113	98								
13	BD	3x2x1/4	138	154								
14	V	6x4x7/16	89	197								
14	HT l	8x6x9/16	27	120								
	r	8x6x9/16	28	120								
14	HB	6x6x9/16	64	240								
14	D t	6x31/2x6/16	227	155	1.000	1.380	0.740	0.625	0.115	0.403	0.327	0.076
	b	6x31/2x6/16	228	155	1.000	1.380	0.740	0.625	0.115	0.403	0.327	0.076
14	BV	3x2.5x1/4	114	97								
14	BD	3x2x1/4	139	153								
15	V	6x4x3/8	90	193								
15	HT l	8x6x9/16	29	120								
	r	8x6x9/16	30	120								
15	HB	6x6x9/16	65	240								
15	D t	4x3x5/16	229	154	1.000	1.168	1.210	0.913	0.297	0.672	0.476	0.196
	b	4x3x5/16	230	154	1.000	1.168	1.198	0.906	0.292	0.665	0.473	0.193
15	BV	3x2.5x1/4	115	95								
15	BD	3x2x1/4	140	152								
16	V	6x4x3/8	91	190								
16	HT l	8x6x9/16	31	120								
	r	8x6x9/16	32	120								
16	HB	6x6x9/16	66	240								
16	D t	31/2x21/2x5/16	231	153	1.000	0.966	1.752	1.141	0.611	0.999	0.595	0.403
	b	31/2x21/2x5/16	232	153	1.000	0.966	1.713	1.132	0.581	0.974	0.591	0.383
16	BV	3x2x1/4	116	93								
16	BD	3x2x1/4	141	151								
17	V	6x31/2x5/16	92	187								
17	HT l	8x6x5/8	33	120								
	r	8x6x5/8	34	120								
17	HB	6x6x11/16	67	240								
17	D t	3x21/2x5/16	233	152			fa>Fe			0.447		
	b	3x21/2x5/16	234	152			fa>Fe			0.440		
17	BV	3x2.5x1/4	117	92								
17	BD	3x2x1/4	142	150								
18	V	6x31/2x5/16	93	183								
18	HT l	8x6x5/8	35	120								
	r	8x6x5/8	36	120								
18	HB	6x6x11/16	68	240								
18	D t	3x2.5x1/4	235	151	1.000	0.767	1.386	1.132	0.254	0.758	0.591	0.168
	b	3x2x5/16	236	151	1.000	0.767	1.254	1.045	0.209	0.683	0.545	0.138
18	BV	3x2x1/4	118	90								
18	BD	3x2x1/4	143	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	94	180								
19	HT l	8x6x5/8	37	120								
	r	8x6x5/8	38	120								
19	HB	6x6x11/16	69	240								
19	D b	4x3x5/16	237	149								
	t	4x3x5/16	238	149								
19	BV	3x2.5x1/4	119	90								
19	BD	3x2x1/4	144	149								
20	V	6x31/2x5/16	95	177								
20	HT l	8x6x5/8	39	120								
	r	8x6x5/8	40	120								
20	HB	6x6x11/16	70	240								
20	D b	3x21/2x5/16	239	148								
	t	3x21/2x5/16	240	148								
20	BV	3x2.5x1/4	120	88								
20	BD	3x2x1/4	145	148								
21	V	6x31/2x5/16	96	173								
21	HT l	8x6x9/16	41	120								
	r	8x6x9/16	42	120								
21	HB	6x6x9/16	71	240								
21	D b	31/2x21/2x5/16	241	147								
	t	31/2x21/2x5/16	242	147								
21	BV	3x2.5x1/4	121	87								
21	BD	3x2x1/4	146	147								
22	V	6x31/2x5/16	97	170								
22	HT l	8x6x9/16	43	120								
	r	8x6x9/16	44	120								
22	HB	6x6x9/16	72	240								
22	D b	5x3x5/16	243	146	1.000	1.084	0.550	0.457	0.094	0.300	0.238	0.062
	t	5x3x5/16	244	146	1.000	1.084	0.578	0.483	0.095	0.315	0.252	0.063
22	BV	3x2.5x1/4	122	85								
22	BD	3x2x1/4	147	146								
23	V	6x4x3/8	98	167								
23	HT l	8x6x9/16	45	120								
	r	8x6x9/16	46	120								
23	HB	6x6x9/16	73	240								
23	D b	6x31/2x5/16	245	145	1.000	1.380	0.525	0.428	0.097	0.288	0.224	0.064
	t	6x31/2x5/16	246	145	1.000	1.380	0.536	0.438	0.097	0.294	0.230	0.064
23	BV	3x2.5x1/4	123	83								
23	BD	3x2x1/4	148	145								
24	V	6x4x3/8	99	163								
24	HT l	8x6x9/16	47	120								
	r	8x6x9/16	48	120								
24	HB	6x6x9/16	74	240								
24	D b	6x4x3/8	247	144								
	t	6x4x3/8	248	144								
24	BV	3x2.5x1/4	124	82								
24	BD	3x2x1/4	149	144								
End	EV t	18-I-64	100	118								
	b	18-I-64	49	42								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length	K	r		AXL	B33		AXL	B33
South End	1S	8-I-17	301	78								
	2S	12-I-23	302	312	1.000	0.848	0.978	0.802	0.176	0.535	0.418	0.116
	3S	10-I-21	303	78								
	4S	14-I-30	304	312								
	5S	14-I-30	305	78								
		14-I-30	306	78								
		14-I-30	307	78								
		14-I-30	308	78								
	6S	10-I-21	313	78								
	7S	18-I-47	309	78								
		18-I-47	310	78								
		18-I-47	311	78								
		18-I-47	312	78								
	8S	8-H-31	314	181								
	9S	8-H-31	315	217								
	10S	8-H-31	316	42								
	11S	18-I-47	317	181								
	12S	18-I-47	318	161								
	13S	18-I-47	331	43								
	14S	18-I-47	319	42								
	15S	18-I-64	320	181								
	16S	18-I-64	321	161								
	17S	18-I-64	322	43								
	18S	18-I-64	50	42								
	19S	31/2x21/2x5/16	323	175	1.000	0.966	0.503	0.417	0.086	0.274	0.218	0.057
		31/2x21/2x5/16	324	175	1.000	0.966	0.555	0.441	0.114	0.305	0.230	0.075
	20S	31/2x21/2x5/16	325	175								
		31/2x21/2x5/16	326	175								
	21S	31/2x21/2x5/16	327	180	1.000	0.966	1.135	0.934	0.201	0.620	0.487	0.133
		31/2x21/2x5/16	328	180	1.000	0.966	1.275	0.959	0.316	0.709	0.500	0.209
	22S	31/2x21/2x5/16	329	180	1.000	0.966	0.506	0.384	0.123	0.282	0.200	0.081
		31/2x21/2x5/16	330	180								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
North	1N	8-I-17	352	78								
End	2N	12-I-23	351	312	1.000	0.848	0.978	0.802	0.176	0.535	0.418	0.116
	3N	10-I-21	354	78								
	4N	14-I-30	353	312								
	5N	14-I-30	355	78								
		14-I-30	356	78								
		14-I-30	357	78								
		14-I-30	358	78								
	6N	10-I-21	363	78								
	7N	18-I-47	359	78								
		18-I-47	360	78								
		18-I-47	361	78								
		18-I-47	362	78								
	8N	8-H-31	364	181								
	9N	8-H-31	365	217								
	10N	8-H-31	366	42								
	11N	18-I-47	367	181								
	12N	18-I-47	368	161								
	13N	18-I-47	369	43								
	14N	18-I-47	370	42								
	15N	18-I-64	371	181								
	16N	18-I-64	372	161								
	17N	18-I-64	373	43								
	18N	18-I-64	49	42								
	19N	31/2x21/2x5/16	374	175	1.000	0.966	0.625	0.519	0.107	0.341	0.271	0.071
		31/2x21/2x5/16	375	175	1.000	0.966	0.667	0.543	0.124	0.365	0.283	0.082
	20N	31/2x21/2x5/16	376	175								
		31/2x21/2x5/16	377	175								
	21N	31/2x21/2x5/16	378	180	1.000	0.966	1.251	0.992	0.259	0.689	0.518	0.171
		31/2x21/2x5/16	379	180	1.000	0.966	1.550	1.013	0.537	0.883	0.529	0.354
	22N	31/2x21/2x5/16	380	180								
		31/2x21/2x5/16	381	180								
Center	CC	14-I-87	385	384								
Column												
		Total Overstressed Members					20			0		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.12. Hangars 44 and 45 Truss T2, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
1	V t	18-I-64	76	118						
	b	18-I-64	50	42						
1	HT l	8x6x9/16	1	120						
	r	8x6x9/16	2	120						
1	HB	6x6x9/16	51	240						
1	D t	6x4x3/8	201	134						
	b	6x4x3/8	202	134						
1	BV	3x2.5x1/4	101	61						
1	BD	3x2x1/4	126	135						
2	V	6x4x3/8	77	163						
2	HT l	8x6x9/16	3	120						
	r	8x6x9/16	4	120						
2	HB	6x6x9/16	52	240						
2	D t	6x31/2x5/16	203	145						
	b	6x31/2x5/16	204	145						
2	BV	3x2.5x1/4	102	83						
2	BD	3x2x1/4	127	147						
3	V	6x4x3/8	78	167						
3	HT l	8x6x9/16	5	120						
	r	8x6x9/16	6	120						
3	HB	6x6x9/16	53	240						
3	D t	5x3x5/16	205	146						
	b	5x3x5/16	206	146						
3	BV	3x2.5x1/4	103	85						
3	BD	3x2x1/4	128	148						
4	V	6x31/2x5/16	79	170						
4	HT l	8x6x9/16	7	120						
	r	8x6x9/16	8	120						
4	HB	6x6x9/16	54	240						
4	D t	31/2x21/2x5/16	207	147						
	b	31/2x21/2x5/16	208	147						
4	BV	3x2.5x1/4	104	87						
4	BD	3x2x1/4	129	149						
5	V	6x31/2x5/16	80	173						
5	HT l	8x6x5/8	9	120						
	r	8x6x5/8	10	120						
5	HB	6x6x11/16	55	240						
5	D t	3x21/2x5/16	209	148						
	b	3x21/2x5/16	210	148						
5	BV	3x2.5x1/4	105	88						
5	BD	3x2x1/4	130	150						
6	V	6x31/2x5/16	81	177						
6	HT l	8x6x5/8	11	120						
	r	8x6x5/8	12	120						
6	HB	6x6x11/16	56	240						
6	D t	4x3x5/16	211	149						
	b	4x3x5/16	212	149						
6	BV	3x2.5x1/4	106	90						
6	BD	3x2x1/4	131	151						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	82	180						
7	HT l	8x6x5/8	13	120						
	r	8x6x5/8	14	120						
7	HB	6x6x11/16	57	240						
7	D b	3x2x5/16	213	151						
	t	3x2x5/16	214	151						
7	BV	3x2.5x1/4	107	90						
7	BD	3x2x1/4	132	149						
8	V	6x31/2x5/16	83	183						
8	HT l	8x6x5/8	15	120						
	r	8x6x5/8	16	120						
8	HB	6x6x11/16	58	240						
8	D b	3x21/2x5/16	215	152						
	t	3x21/2x5/16	216	152						
8	BV	3x2.5x1/4	108	92						
8	BD	3x2x1/4	133	150						
9	V	6x31/2x5/16	84	187						
9	HT l	8x6x9/16	17	120						
	r	8x6x9/16	18	120						
9	HB	6x6x9/16	59	240						
9	D b	31/2x21/2x5/16	217	153						
	t	31/2x21/2x5/16	218	153						
9	BV	3x2.5x1/4	109	93						
9	BD	3x2x1/4	134	151						
10	V	6x4x3/8	85	190						
10	HT l	8x6x9/16	19	120						
	r	8x6x9/16	20	120						
10	HB	6x6x9/16	60	240						
10	D b	4x3x5/16	219	154						
	t	4x3x5/16	220	154						
10	BV	3x2.5x1/4	110	95						
10	BD	3x2x1/4	135	152						
11	V	6x4x3/8	86	193						
11	HT l	8x6x9/16	21	120						
	r	8x6x9/16	22	120						
11	HB	6x6x9/16	61	240						
11	D b	6x31/2x6/16	221	155						
	t	6x31/2x6/16	222	155						
11	BV	3x2.5x1/4	111	97						
11	BD	3x2x1/4	136	153						
12	V	6x4x7/16	87	197						
12	HT l	8x6x9/16	23	120						
	r	8x6x9/16	24	120						
12	HB	6x6x9/16	62	240						
12	D b	6x31/2x3/8	223	156						
	t	6x31/2x3/8	224	156						
12	BV	3x2.5x1/4	112	98						
12	BD	3x2x1/4	137	154						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	14-I-87	88	200						
13	HT l	8x6x9/16	25	120						
	r	8x6x9/16	26	120						
13	HB	6x6x9/16	63	240						
13	D t	6x31/2x3/8	225	156						
	b	6x31/2x3/8	226	156						
13	BV	3x21/2x1/4	113	98						
13	BD	3x2x1/4	138	154						
14	V	6x4x7/16	89	197						
14	HT l	8x6x9/16	27	120						
	r	8x6x9/16	28	120						
14	HB	6x6x9/16	64	240						
14	D t	6x31/2x6/16	227	155						
	b	6x31/2x6/16	228	155						
14	BV	3x2.5x1/4	114	97						
14	BD	3x2x1/4	139	153						
15	V	6x4x3/8	90	193						
15	HT l	8x6x9/16	29	120						
	r	8x6x9/16	30	120						
15	HB	6x6x9/16	65	240						
15	D t	4x3x5/16	229	154						
	b	4x3x5/16	230	154						
15	BV	3x2.5x1/4	115	95						
15	BD	3x2x1/4	140	152						
16	V	6x4x3/8	91	190						
16	HT l	8x6x9/16	31	120						
	r	8x6x9/16	32	120						
16	HB	6x6x9/16	66	240						
16	D t	31/2x21/2x5/16	231	153						
	b	31/2x21/2x5/16	232	153						
16	BV	3x2.5x1/4	116	93						
16	BD	3x2x1/4	141	151						
17	V	6x31/2x5/16	92	187						
17	HT l	8x6x5/8	33	120						
	r	8x6x5/8	34	120						
17	HB	6x6x11/16	67	240						
17	D t	3x21/2x5/16	233	152						
	b	3x21/2x5/16	234	152						
17	BV	3x2.5x1/4	117	92						
17	BD	3x2x1/4	142	150						
18	V	6x31/2x5/16	93	183						
18	HT l	8x6x5/8	35	120						
	r	8x6x5/8	36	120						
18	HB	6x6x11/16	68	240						
18	D t	3x2x5/16	235	151						
	b	3x2x5/16	236	151						
18	BV	3x2.5x1/4	118	90						
18	BD	3x2x1/4	143	149						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
19	V	6x31/2x5/16	94	180						
19	HT l	8x6x5/8	37	120						
	r	8x6x5/8	38	120						
19	HB	6x6x11/16	69	240						
19	D b	4x3x5/16	237	149						
	t	4x3x5/16	238	149						
19	BV	3x2.5x1/4	119	90						
19	BD	3x2x1/4	144	149						
20	V	6x31/2x5/16	95	177						
20	HT l	8x6x5/8	39	120						
	r	8x6x5/8	40	120						
20	HB	6x6x11/16	70	240						
20	D b	3x21/2x5/16	239	148						
	t	3x21/2x5/16	240	148						
20	BV	3x2.5x1/4	120	88						
20	BD	3x2x1/4	145	148						
21	V	6x31/2x5/16	96	173						
21	HT l	8x6x9/16	41	120						
	r	8x6x9/16	42	120						
21	HB	6x6x9/16	71	240						
21	D b	31/2x21/2x5/16	241	147						
	t	31/2x21/2x5/16	242	147						
21	BV	3x2.5x1/4	121	87						
21	BD	3x2x1/4	146	147						
22	V	6x31/2x5/16	97	170						
22	HT l	8x6x9/16	43	120						
	r	8x6x9/16	44	120						
22	HB	6x6x9/16	72	240						
22	D b	5x3x5/16	243	146						
	t	5x3x5/16	244	146						
22	BV	3x2.5x1/4	122	85						
22	BD	3x2x1/4	147	146						
23	V	6x4x3/8	98	167						
23	HT l	8x6x9/16	45	120						
	r	8x6x9/16	46	120						
23	HB	6x6x9/16	73	240						
23	D b	6x31/2x5/16	245	145						
	t	6x31/2x5/16	246	145						
23	BV	3x2.5x1/4	123	83						
23	BD	3x2x1/4	148	145						
24	V	6x4x3/8	99	163						
24	HT l	8x6x9/16	47	120						
	r	8x6x9/16	48	120						
24	HB	6x6x9/16	74	240						
24	D b	6x4x3/8	247	144						
	t	6x4x3/8	248	144						
24	BV	3x2.5x1/4	124	82						
24	BD	3x2x1/4	149	144						
End	EV t	18-I-64	100	118						
	b	18-I-64	49	42						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
South End	1S	8-H-31	310	171						
		8-H-31	311	213						
		8-H-31	316	43						
	2S	18-I-47	312	132						
		18-I-47	314	39						
		18-I-47	315	83						
		18-I-47	317	130						
		18-I-47	319	43						
	3S	18-I-64	318	132						
		18-I-64	320	122						
		18-I-64	321	130						
	4S	8-I-17	301	78						
		14-I-30	302	312						
	5S	10-I-21	303	78						
		14-I-30	304	312						
	6S	2 C's 12x40	305	312						
	7S	10-I-21	306	78						
	8S	2 C's 12x40	307	312						
	10S	3.5x2.5x5/16	324	169						
		3.5x2.5x5/16	325	169						
	11S	3.5x2.5x5/16	322	169						
		3.5x2.5x5/16	323	169						
	12S	3.5x2.5x5/16	328	169						
		3.5x2.5x5/16	329	169						
	13S	3.5x2.5x5/16	326	169						
		3.5x2.5x5/16	327	169						
	14S	3.5x2.5x5/16	332	169						
		3.5x2.5x5/16	333	169						
	15S	3.5x2.5x5/16	330	169						
		3.5x2.5x5/16	331	169						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
North End	1N	8-I-17	352	78						
	2N	12-I-23	351	312						
	3N	10-I-21	354	78						
	4N	14-I-30	353	312						
	5N	14-I-30	355	78						
		14-I-30	356	78						
		14-I-30	357	78						
		14-I-30	358	78						
	6N	10-I-21	363	78						
	7N	18-I-47	359	78						
		18-I-47	360	78						
		18-I-47	361	78						
		18-I-47	362	78						
	8N	8-H-31	364	181						
	9N	8-H-31	365	217						
	10N	8-H-31	366	42						
	11N	18-I-47	367	181						
	12N	18-I-47	368	161						
	13N	18-I-47	369	43						
	14N	18-I-47	370	42						
	15N	18-I-64	371	181						
	16N	18-I-64	372	161						
	17N	18-I-64	373	43						
	18N	18-I-64	49	42						
	19N	31/2x21/2x5/16	374	175						
		31/2x21/2x5/16	375	175						
	20N	31/2x21/2x5/16	376	175						
		31/2x21/2x5/16	377	175						
	21N	31/2x21/2x5/16	378	180						
		31/2x21/2x5/16	379	180						
	22N	31/2x21/2x5/16	380	180						
		31/2x21/2x5/16	381	180						
Center Column	CC	14-I-87	385	384						
Total Overstressed Members					0			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.13. Hangars 44 and 45 Truss T2, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V t	18-I-64	76	118								
	b	18-I-64	50	42								
1	HT l	8x6x9/16	1	120								
	r	8x6x9/16	2	120								
1	HB	6x6x9/16	51	240								
1	D t	6x4x3/8	201	134	1.000	1.673	0.546	0.386	0.160	0.312	0.206	0.106
	b	6x4x3/8	202	134	1.000	1.673	0.530	0.371	0.159	0.303	0.198	0.105
1	BV	3x2.5x1/4	101	61								
1	BD	3x2x1/4	126	135								
2	V	6x4x3/8	77	163								
2	HT l	8x6x9/16	3	120								
	r	8x6x9/16	4	120								
2	HB	6x6x9/16	52	240								
2	D t	6x31/2x5/16	203	145								
	b	6x31/2x5/16	204	145								
2	BV	3x2.5x1/4	102	83								
2	BD	3x2x1/4	127	147								
3	V	6x4x3/8	78	167								
3	HT l	8x6x9/16	5	120								
	r	8x6x9/16	6	120								
3	HB	6x6x9/16	53	240								
3	D t	5x3x5/16	205	146	1.000	1.084	0.588	0.491	0.096	0.320	0.256	0.063
	b	5x3x5/16	206	146	1.000	1.084	0.562	0.466	0.095	0.306	0.243	0.063
3	BV	3x2.5x1/4	103	85								
3	BD	3x2x1/4	128	148								
4	V	6x31/2x5/16	79	170								
4	HT l	8x6x9/16	7	120								
	r	8x6x9/16	8	120								
4	HB	6x6x9/16	54	240								
4	D t	31/2x21/2x5/	207	147								
	b	31/2x21/2x5/	208	147								
4	BV	3x2.5x1/4	104	87								
4	BD	3x2x1/4	129	149								
5	V	6x31/2x5/16	80	173								
5	HT l	8x6x5/8	9	120								
	r	8x6x5/8	10	120								
5	HB	6x6x11/16	55	240								
5	D t	3x21/2x5/16	209	148								
	b	3x21/2x5/16	210	148								
5	BV	3x2.5x1/4	105	88								
5	BD	3x2x1/4	130	150								
6	V	6x31/2x5/16	81	177								
6	HT l	8x6x5/8	11	120								
	r	8x6x5/8	12	120								
6	HB	6x6x11/16	56	240								
6	D t	4x3x5/16	211	149								
	b	4x3x5/16	212	149								
6	BV	3x2.5x1/4	106	90								
6	BD	3x2x1/4	131	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	82	180								
7	HT l	8x6x5/8	13	120								
	r	8x6x5/8	14	120								
7	HB	6x6x11/16	57	240								
7	D b	3x2x5/16	213	151	1.000	0.767	1.220	1.021	0.199	0.664	0.533	0.131
	t	3x2x5/16	214	151	1.000	0.767	1.347	1.108	0.240	0.736	0.578	0.158
7	BV	3x2.5x1/4	107	90								
7	BD	3x2x1/4	132	149								
8	V	6x31/2x5/16	83	183								
8	HT l	8x6x5/8	15	120								
	r	8x6x5/8	16	120								
8	HB	6x6x11/16	58	240								
8	D b	3x21/2x5/16	215	152			fa>Fe			0.434		
	t	3x21/2x5/16	216	152			fa>Fe			0.442		
8	BV	3x2.5x1/4	108	92								
8	BD	3x2x1/4	133	150								
9	V	6x31/2x5/16	84	187								
9	HT l	8x6x9/16	17	120								
	r	8x6x9/16	18	120								
9	HB	6x6x9/16	59	240								
9	D b	31/2x21/2x5/	217	153	1.000	0.966	1.665	1.120	0.545	0.944	0.584	0.360
	t	31/2x21/2x5/	218	153	1.000	0.966	1.700	1.129	0.571	0.966	0.589	0.377
9	BV	3x2.5x1/4	109	93								
9	BD	3x2x1/4	134	151								
10	V	6x4x3/8	85	190								
10	HT l	8x6x9/16	19	120								
	r	8x6x9/16	20	120								
10	HB	6x6x9/16	60	240								
10	D b	4x3x5/16	219	154	1.000	1.168	1.185	0.899	0.286	0.658	0.469	0.189
	t	4x3x5/16	220	154	1.000	1.168	1.196	0.905	0.291	0.664	0.472	0.192
10	BV	3x2.5x1/4	110	95								
10	BD	3x2x1/4	135	152								
11	V	6x4x3/8	86	193								
11	HT l	8x6x9/16	21	120								
	r	8x6x9/16	22	120								
11	HB	6x6x9/16	61	240								
11	D b	6x31/2x6/16	221	155	1.000	1.380	0.782	0.660	0.121	0.425	0.345	0.080
	t	6x31/2x6/16	222	155	1.000	1.380	0.789	0.667	0.122	0.429	0.349	0.081
11	BV	3x2.5x1/4	111	97								
11	BD	3x2x1/4	136	153								
12	V	6x4x7/16	87	197								
12	HT l	8x6x9/16	23	120								
	r	8x6x9/16	24	120								
12	HB	6x6x9/16	62	240	1.000	1.861	0.533	0.436	0.097	0.291	0.227	0.064
12	D b	6x31/2x3/8	223	156								
	t	6x31/2x3/8	224	156								
12	BV	3x21/2x1/4	112	98								
12	BD	3x2x1/4	137	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length	K	r		AXL	B33		AXL	B33
13	V	14-I-87	88	200								
13	HT l	8x6x9/16	25	120								
	r	8x6x9/16	26	120								
13	HB	6x6x9/16	63	240	1.000	1.861	0.533	0.436	0.097	0.291	0.227	0.064
13	D t	6x31/2x3/8	225	156								
	b	6x31/2x3/8	226	156								
13	BV	3x21/2x1/4	113	98								
13	BD	3x2x1/4	138	154								
14	V	6x4x7/16	89	197								
14	HT l	8x6x9/16	27	120								
	r	8x6x9/16	28	120								
14	HB	6x6x9/16	64	240								
14	D t	6x31/2x6/16	227	155	1.000	1.380	0.789	0.667	0.122	0.429	0.349	0.081
	b	6x31/2x6/16	228	155	1.000	1.380	0.782	0.660	0.121	0.425	0.345	0.080
14	BV	3x2.5x1/4	114	97								
14	BD	3x2x1/4	139	153								
15	V	6x4x3/8	90	193								
15	HT l	8x6x9/16	29	120								
	r	8x6x9/16	30	120								
15	HB	6x6x9/16	65	240								
15	D t	4x3x5/16	229	154	1.000	1.168	1.196	0.905	0.291	0.664	0.472	0.192
	b	4x3x5/16	230	154	1.000	1.168	1.185	0.899	0.286	0.658	0.469	0.189
15	BV	3x2.5x1/4	115	95								
15	BD	3x2x1/4	140	152								
16	V	6x4x3/8	91	190								
16	HT l	8x6x9/16	31	120								
	r	8x6x9/16	32	120								
16	HB	6x6x9/16	66	240								
16	D t	31/2x21/2x5/	231	153	1.000	0.966	1.700	1.129	0.571	0.966	0.589	0.377
	b	31/2x21/2x5/	232	153	1.000	0.966	1.665	1.120	0.545	0.944	0.584	0.360
16	BV	3x2.5x1/4	116	93								
16	BD	3x2x1/4	141	151								
17	V	6x31/2x5/16	92	187								
17	HT l	8x6x5/8	33	120								
	r	8x6x5/8	34	120								
17	HB	6x6x11/16	67	240								
17	D t	3x21/2x5/16	233	152			fa>Fe			0.442		
	b	3x21/2x5/16	234	152			fa>Fe			0.434		
17	BV	3x2.5x1/4	117	92								
17	BD	3x2x1/4	142	150								
18	V	6x31/2x5/16	93	183								
18	HT l	8x6x5/8	35	120								
	r	8x6x5/8	36	120								
18	HB	6x6x11/16	68	240								
18	D t	3x2x5/16	235	151	1.000	0.767	1.347	1.108	0.240	0.736	0.578	0.158
	b	3x2x5/16	236	151	1.000	0.767	1.220	1.021	0.199	0.664	0.533	0.131
18	BV	3x2.5x1/4	118	90								
18	BD	3x2x1/4	143	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
19	V	6x31/2x5/16	94	180								
19	HT l	8x6x5/8	37	120								
	r	8x6x5/8	38	120								
19	HB	6x6x11/16	69	240								
19	D b	4x3x5/16	237	149								
	t	4x3x5/16	238	149								
19	BV	3x2.5x1/4	119	90								
19	BD	3x2x1/4	144	149								
20	V	6x31/2x5/16	95	177								
20	HT l	8x6x5/8	39	120								
	r	8x6x5/8	40	120								
20	HB	6x6x11/16	70	240								
20	D b	3x21/2x5/16	239	148								
	t	3x21/2x5/16	240	148								
20	BV	3x2.5x1/4	120	88								
20	BD	3x2x1/4	145	148								
21	V	6x31/2x5/16	96	173								
21	HT l	8x6x9/16	41	120								
	r	8x6x9/16	42	120								
21	HB	6x6x9/16	71	240								
21	D b	31/2x21/2x5/	241	147								
	t	31/2x21/2x5/	242	147								
21	BV	3x2.5x1/4	121	87								
21	BD	3x2x1/4	146	147								
22	V	6x31/2x5/16	97	170								
22	HT l	8x6x9/16	43	120								
	r	8x6x9/16	44	120								
22	HB	6x6x9/16	72	240								
22	D b	5x3x5/16	243	146	1.000	1.084	0.562	0.467	0.095	0.306	0.244	0.063
	t	5x3x5/16	244	146	1.000	1.084	0.588	0.491	0.096	0.320	0.256	0.063
22	BV	3x2.5x1/4	122	85								
22	BD	3x2x1/4	147	146								
23	V	6x4x3/8	98	167								
23	HT l	8x6x9/16	45	120								
	r	8x6x9/16	46	120								
23	HB	6x6x9/16	73	240								
23	D b	6x31/2x5/16	245	145								
	t	6x31/2x5/16	246	145								
23	BV	3x2.5x1/4	123	83								
23	BD	3x2x1/4	148	145								
24	V	6x4x3/8	99	163								
24	HT l	8x6x9/16	47	120								
	r	8x6x9/16	48	120								
24	HB	6x6x9/16	74	240								
24	D b	6x4x3/8	247	144	1.000	1.673	0.530	0.371	0.159	0.302	0.197	0.105
	t	6x4x3/8	248	144	1.000	1.673	0.546	0.386	0.160	0.311	0.205	0.106
24	BV	3x2.5x1/4	124	82								
24	BD	3x2x1/4	149	144								
End	EV t	18-I-64	100	118								
	b	18-I-64	49	42								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South End	1S	8-H-31	310	171								
		8-H-31	311	213								
		8-H-31	316	43								
	2S	18-I-47	312	132								
		18-I-47	314	39								
		18-I-47	315	83								
		18-I-47	317	130								
		18-I-47	319	43								
	3S	18-I-64	318	132								
		18-I-64	320	122								
		18-I-64	321	130								
	4S	8-I-17	301	78								
		14-I-30	302	312	1.000	1.231	1.042	0.802	0.240	0.577	0.418	0.158
	5S	10-I-21	303	78								
		14-I-30	304	312								
	6S	2 C's 12x40	305	312								
	7S	10-I-21	306	78								
	8S	2 C's 12x40	307	312								
	10S	3.5x2.5x5/16	324	169								
		3.5x2.5x5/16	325	169								
	11S	3.5x2.5x5/16	322	169	1.000	0.966	0.574	0.469	0.105	0.314	0.245	0.069
		3.5x2.5x5/16	323	169	1.000	0.966	0.526	0.443	0.083	0.286	0.231	0.055
	12S	3.5x2.5x5/16	328	169								
		3.5x2.5x5/16	329	169								
	13S	3.5x2.5x5/16	326	169	1.000	0.966	0.517	0.421	0.095	0.282	0.220	0.063
		3.5x2.5x5/16	327	169								
	14S	3.5x2.5x5/16	332	169	1.000	0.966	0.892	0.756	0.136	0.484	0.394	0.090
		3.5x2.5x5/16	333	169	1.000	0.966	0.991	0.781	0.209	0.545	0.407	0.138
	15S	3.5x2.5x5/16	330	169	1.000	0.966	1.119	0.892	0.227	0.615	0.465	0.150
		3.5x2.5x5/16	331	169	1.000	0.966	1.006	0.866	0.140	0.544	0.452	0.092

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
North	1N	8-I-17	352	78								
End	2N	12-I-23	351	312	1.000	0.848	0.951	0.802	0.149	0.517	0.418	0.098
	3N	10-I-21	354	78								
	4N	14-I-30	353	312								
	5N	14-I-30	355	78								
		14-I-30	356	78								
		14-I-30	357	78								
		14-I-30	358	78								
	6N	10-I-21	363	78								
	7N	18-I-47	359	78								
		18-I-47	360	78								
		18-I-47	361	78								
		18-I-47	362	78								
	8N	8-H-31	364	181								
	9N	8-H-31	365	217								
	10N	8-H-31	366	42								
	11N	18-I-47	367	181								
	12N	18-I-47	368	161								
	13N	18-I-47	369	43								
	14N	18-I-47	370	42								
	15N	18-I-64	371	181								
	16N	18-I-64	372	161								
	17N	18-I-64	373	43								
	18N	18-I-64	49	42								
	19N	31/2x21/2x5/	374	175	1.000	0.966	0.631	0.523	0.107	0.343	0.273	0.071
		31/2x21/2x5/	375	175	1.000	0.966	0.672	0.548	0.124	0.368	0.286	0.082
	20N	31/2x21/2x5/	376	175	1.000	0.966	0.561	0.446	0.115	0.309	0.233	0.076
		31/2x21/2x5/	377	175	1.000	0.966	0.509	0.422	0.087	0.278	0.220	0.057
	21N	31/2x21/2x5/	378	180	1.000	0.966	1.186	0.953	0.233	0.651	0.497	0.154
		31/2x21/2x5/	379	180	1.000	0.966	1.458	0.978	0.480	0.827	0.510	0.317
	22N	31/2x21/2x5/	380	180	1.000	0.966	1.263	0.953	0.310	0.702	0.497	0.205
		31/2x21/2x5/	381	180	1.000	0.966	1.125	0.928	0.198	0.615	0.484	0.131
Center	CC	14-I-87	385	384								
Column												
Total Overstressed Members							23			0		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.14. Hangars 43 and 47 Truss T3 Stepped Wind Loading, Tension.

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x3/8	7402	156.2						
		7x4x3/8	7403	156.2						
1	D2	7x4x3/8	7409	156.2						
		7x4x3/8	7410	156.2						
2	V	14-I-142	7381	200	0.838	0.716	0.121	0.509	0.430	0.080
2	HT	14-H-87	7351	240	0.717	0.469	0.247	0.444	0.281	0.163
2	HB	14-H-78	7363	240	1.065	0.717	0.349	0.661	0.430	0.230
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	1.318	0.965	0.353	0.812	0.579	0.233
3	HT	14-H-87	7352	240	0.749	0.540	0.209	0.462	0.324	0.138
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.665	0.566	0.099	0.405	0.340	0.065
4	HT	14-H-87	7353	240	0.649	0.471	0.178	0.400	0.283	0.117
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2	0.682	0.662	0.019	0.410	0.397	0.013
		5x3x5/16	7416	156.2	0.675	0.660	0.015	0.406	0.396	0.010
5	V	14x8 I-43	7384	200	0.915	0.687	0.228	0.563	0.412	0.150
5	HT	14-H-87	7354	240	0.672	0.465	0.207	0.416	0.279	0.137
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240						
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.424	0.994	0.431	0.881	0.596	0.284
6	HT	14-H-87	7355	240	0.585	0.187	0.398	0.375	0.112	0.263
6	HB	14-H-78	7367	240	1.303	1.072	0.232	0.796	0.643	0.153
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200	0.758	0.716	0.042	0.457	0.430	0.028
7	HT	14-H-87	7356	240	0.591	0.200	0.391	0.378	0.120	0.258
7	HB	14-H-78	7368	240	1.367	1.075	0.292	0.838	0.645	0.193
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.406	0.982	0.423	0.868	0.589	0.279
8	HT	14-H-87	7357	240	0.654	0.453	0.201	0.404	0.272	0.133
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240						
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
9	V	14x8 I-43	7388	200	0.885	0.656	0.229	0.545	0.394	0.151
9	HT	14-H-87	7358	240	0.630	0.473	0.157	0.387	0.284	0.104
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2	0.792	0.775	0.016	0.476	0.465	0.011
		5x3x5/16	7422	156.2	0.794	0.778	0.016	0.477	0.467	0.011
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.580	0.498	0.082	0.353	0.299	0.054
10	HT	14-H-87	7359	240	0.703	0.527	0.176	0.432	0.316	0.116
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	1.031	0.759	0.271	0.634	0.455	0.179
11	HT	14-H-87	7360	240	0.737	0.553	0.184	0.453	0.332	0.121
11	HB	14-H-78	7372	240	0.597	0.374	0.223	0.372	0.224	0.147
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200	0.628	0.537	0.091	0.382	0.322	0.060
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.528	0.494	0.034	0.319	0.296	0.022
	top+bot	Laced								
12	D1	7x4x3/8	7427	156.2						
		7x4x3/8	7428	156.2						
12	D2	7x4x3/8	7429	156.2						
		7x4x3/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192	0.739	0.691	0.048	0.446	0.415	0.032
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192	0.543	0.527	0.016	0.327	0.316	0.011
	4E	14-I-142	7380	192	0.864	0.657	0.207	0.531	0.394	0.137
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7	0.781	0.712	0.069	0.473	0.427	0.046
		7x4x5/8	7401	153.7	0.775	0.714	0.060	0.468	0.428	0.040
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7	0.838	0.780	0.056	0.505	0.468	0.037
		7x4x5/8	7399	153.7	0.848	0.784	0.064	0.513	0.470	0.042
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed			No FOS *		
					Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
West End	1W	14-H-87	7394	192						
	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192	0.870	0.855	0.015	0.523	0.513	0.010
	4W	14-I-142	7392	192	0.717	0.561	0.156	0.440	0.337	0.103
	5W	7x4x5/8	7431	153.7	0.844	0.770	0.075	0.512	0.462	0.050
		7x4x5/8	7432	153.7	0.857	0.773	0.084	0.519	0.464	0.055
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.711	0.638	0.073	0.431	0.383	0.048
		7x4x5/8	7436	153.7	0.708	0.640	0.068	0.429	0.384	0.045
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center Column	CC	33-I-200	7397	384	0.783	0.707	0.076	0.474	0.424	0.050
Total Overstressed Members					7			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 5.15. Hangars 43 and 47 Truss T3 Stepped Wind Loading, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240								
2	D1	14x12 I-78	7411	312.4			fa>Fe			1.114		
3	V	14x10 I-61	7382	200								
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.839	0.563	0.276	0.479	0.297	0.182
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.908		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	1.575	0.776	0.799	0.933	0.406	0.527
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2								
		5x3x5/16	7414	156.2								
4	D2	5x3x5/16	7415	156.2								
		5x3x5/16	7416	156.2								
5	V	14x8 I-43	7384	200								
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.401		
6	V	14x10 I-61	7385	200	1.072	2.445	0.605	0.437	0.169	0.343	0.232	0.112
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240	1.000	2.478	0.908	0.553	0.355	0.526	0.291	0.234
6	D2	14x12 I-78	7418	312.4			fa>Fe			1.133		
7	V	33-I-200	7386	200								
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240	1.000	2.478	0.740	0.547	0.193	0.416	0.288	0.127
7	D1	14x12 I-78	7419	312.4			fa>Fe			1.169		
8	V	14x10 I-61	7387	200	1.072	2.445	0.521	0.380	0.141	0.295	0.202	0.093
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.379		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200								
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	1.575	0.776	0.799	0.933	0.406	0.527
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2								
		5x3x5/16	7422	156.2								
9	D2	5x3x5/16	7423	156.2								
		5x3x5/16	7424	156.2								
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.839	0.563	0.276	0.479	0.297	0.182
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.779		
11	V	14x10 I-61	7390	200	1.072	2.445	0.693	0.488	0.205	0.394	0.259	0.135
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	1.610	0.831	0.780	0.953	0.438	0.515
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.876		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192	1.000	3.982	0.515	0.482	0.033	0.289	0.267	0.022
	4E	14-I-142	7380	192								
	5E	7x4x5/8	7407	153.7	1.000	2.236	1.063	0.995	0.068	0.582	0.538	0.045
		7x4x5/8	7408	153.7	1.000	2.236	1.177	0.999	0.178	0.657	0.540	0.117
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	1.009	0.918	0.091	0.556	0.496	0.060
		7x4x5/8	7406	153.7	1.000	2.236	1.104	0.922	0.182	0.618	0.498	0.120
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192	1.000	3.696	0.782	0.716	0.067	0.439	0.395	0.044
End	2W	14-H-87	7395	192	1.000	3.696	0.545	0.413	0.132	0.315	0.228	0.087
	3W	14-I-142	7391	192								
	4W	14-I-142	7392	192								
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.955	0.875	0.080	0.526	0.473	0.053
		7x4x5/8	7434	153.7	1.000	2.236	1.036	0.878	0.157	0.578	0.474	0.104
	7W	7x4x5/8	7435	153.7	1.000	2.236	0.711	0.638	0.073	0.393	0.345	0.048
		7x4x5/8	7436	153.7	1.000	2.236	0.708	0.640	0.068	0.391	0.346	0.045
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.961	0.861	0.100	0.531	0.465	0.066
		7x4x5/8	7438	153.7	1.000	2.236	1.024	0.857	0.167	0.573	0.463	0.110
	9W	7x4x5/8	7375	240								
Center	CC	33-I-200	7397	384	1.000	3.560	0.571	0.436	0.135	0.317	0.228	0.089
Column												
Total Overstressed Members							17			5		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 5.16. Hangars 43 and 47 Truss T3 Average Wind Loading, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x3/8	7402	156.2						
		7x4x3/8	7403	156.2						
1	D2	7x4x3/8	7409	156.2						
		7x4x3/8	7410	156.2						
2	V	14-I-142	7381	200	0.523	0.454	0.069	0.318	0.272	0.046
2	HT	14-H-87	7351	240						
2	HB	14-H-78	7363	240						
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	0.894	0.675	0.219	0.550	0.405	0.145
3	HT	14-H-87	7352	240						
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.576	0.505	0.071	0.350	0.303	0.047
4	HT	14-H-87	7353	240						
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2						
		5x3x5/16	7416	156.2						
5	V	14x8 I-43	7384	200	0.781	0.627	0.153	0.477	0.376	0.101
5	HT	14-H-87	7354	240						
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240						
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.162	0.844	0.318	0.716	0.506	0.210
6	HT	14-H-87	7355	240						
6	HB	14-H-78	7367	240	0.896	0.713	0.184	0.549	0.428	0.121
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200	0.580	0.580	0.000	0.348	0.348	0.000
7	HT	14-H-87	7356	240						
7	HB	14-H-78	7368	240	0.896	0.713	0.184	0.549	0.428	0.121
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.162	0.844	0.318	0.716	0.506	0.210
8	HT	14-H-87	7357	240						
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240						
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
9	V	14x8 I-43	7388	200	0.781	0.627	0.153	0.477	0.376	0.101
9	HT	14-H-87	7358	240						
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2						
		5x3x5/16	7422	156.2						
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.576	0.505	0.071	0.350	0.303	0.047
10	HT	14-H-87	7359	240						
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	0.894	0.675	0.219	0.550	0.405	0.145
11	HT	14-H-87	7360	240						
11	HB	14-H-78	7372	240						
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200						
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.579	0.457	0.122	0.355	0.274	0.081
	top+bot	Laced								
12	D1	7x4x3/8	7427	156.2						
		7x4x3/8	7428	156.2						
12	D2	7x4x3/8	7429	156.2						
		7x4x3/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192	0.652	0.598	0.054	0.394	0.359	0.036
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192						
	4E	14-I-142	7380	192	0.525	0.436	0.089	0.320	0.262	0.059
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7	0.674	0.632	0.041	0.406	0.379	0.027
		7x4x5/8	7401	153.7	0.671	0.634	0.036	0.404	0.380	0.024
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7	0.761	0.707	0.053	0.459	0.424	0.035
		7x4x5/8	7399	153.7	0.773	0.709	0.064	0.468	0.425	0.042
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length		AXL	B22		AXL	B22
West End	1W	14-H-87	7394	192						
	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192						
	4W	14-I-142	7392	192	0.525	0.436	0.089	0.320	0.262	0.059
	5W	7x4x5/8	7431	153.7	0.699	0.638	0.061	0.423	0.383	0.040
		7x4x5/8	7432	153.7	0.718	0.641	0.077	0.435	0.385	0.051
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.569	0.519	0.050	0.344	0.311	0.033
		7x4x5/8	7436	153.7	0.581	0.522	0.060	0.353	0.313	0.040
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center Column	CC	33-I-200	7397	384	0.545	0.545	0.000	0.327	0.327	0.000
Total Overstressed Members					2			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 5.17. Hangars 43 and 47 Truss T3 Average Wind Loading, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bo	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240	1.000	2.478	0.605	0.334	0.271	0.355	0.176	0.179
2	D1	14x12 I-78	7411	312.4			fa>Fe			0.692		
3	V	14x10 I-61	7382	200	1.072	2.445	0.619	0.447	0.171	0.350	0.237	0.113
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.632	0.438	0.194	0.359	0.231	0.128
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.636		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	1.031	0.611	0.420	0.596	0.319	0.277
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2								
		5x3x5/16	7414	156.2								
4	D2	5x3x5/16	7415	156.2	1.000	1.615	0.601	0.588	0.013	0.318	0.310	0.009
		5x3x5/16	7416	156.2	1.000	1.615	0.605	0.593	0.011	0.320	0.312	0.007
5	V	14x8 I-43	7384	200								
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.033		
6	V	14x10 I-61	7385	200	1.072	2.445	0.946	0.620	0.326	0.544	0.329	0.215
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240	1.000	2.478	1.420	0.796	0.624	0.831	0.419	0.412
6	D2	14x12 I-78	7418	312.4			fa>Fe			0.889		
7	V	33-I-200	7386	200	1.856	3.560	0.568	0.568	0.000	0.298	0.298	0.000
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240	1.000	2.478	1.420	0.796	0.624	0.831	0.419	0.412
7	D1	14x12 I-78	7419	312.4			fa>Fe			0.900		
8	V	14x10 I-61	7387	200	1.072	2.445	0.946	0.620	0.326	0.544	0.329	0.215
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.033		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200								
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	1.031	0.611	0.420	0.596	0.319	0.277
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2								
		5x3x5/16	7422	156.2								
9	D2	5x3x5/16	7423	156.2								
		5x3x5/16	7424	156.2								
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.632	0.438	0.194	0.359	0.231	0.128
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.636		
11	V	14x10 I-61	7390	200	1.072	2.445	0.619	0.447	0.171	0.350	0.237	0.113
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	1.695	0.856	0.839	1.005	0.451	0.554
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.694		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bo	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East	1E	14-H-87	7376	192								
End	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192	1.000	3.982	1.215	1.047	0.168	0.692	0.581	0.111
	4E	14-I-142	7380	192	1.000	3.982	0.812	0.614	0.198	0.471	0.341	0.131
	5E	7x4x5/8	7407	153.7	1.000	2.236	1.047	0.989	0.059	0.573	0.534	0.039
		7x4x5/8	7408	153.7	1.000	2.236	1.180	0.992	0.187	0.659	0.536	0.123
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	0.998	0.909	0.089	0.550	0.491	0.059
		7x4x5/8	7406	153.7	1.000	2.236	1.111	0.913	0.198	0.624	0.493	0.131
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192	1.000	3.696	0.966	0.853	0.113	0.545	0.471	0.075
End	2W	14-H-87	7395	192								
	3W	14-I-142	7391	192	3.792	3.982	0.550	0.531	0.019	0.290	0.277	0.013
	4W	14-I-142	7392	192	3.792	3.982	0.680	0.577	0.103	0.369	0.301	0.068
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.933	0.851	0.082	0.514	0.460	0.054
		7x4x5/8	7434	153.7	1.000	2.236	0.961	0.849	0.111	0.532	0.459	0.073
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.906	0.817	0.089	0.500	0.441	0.059
		7x4x5/8	7438	153.7	1.000	2.236	0.980	0.821	0.159	0.549	0.444	0.105
	9W	7x4x5/8	7375	240								
Center	CC	33-I-200	7397	384								
Colum												
		Total Overstressed Members					17			3		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 5.18. Hangars 44 and 45 Truss T3 Stepped Wind Loading, Tension.

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x3/8	7402	156.2						
		7x4x3/8	7403	156.2						
1	D2	7x4x3/8	7409	156.2	0.506	0.439	0.067	0.308	0.263	0.044
		7x4x3/8	7410	156.2						
2	V	14-I-142	7381	200	0.847	0.723	0.123	0.515	0.434	0.081
2	HT	14-H-87	7351	240	0.727	0.476	0.251	0.451	0.286	0.166
2	HB	14-H-78	7363	240	1.077	0.724	0.354	0.668	0.434	0.234
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	1.329	0.971	0.357	0.818	0.583	0.236
3	HT	14-H-87	7352	240	0.760	0.549	0.211	0.469	0.329	0.139
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.664	0.564	0.100	0.404	0.338	0.066
4	HT	14-H-87	7353	240	0.659	0.479	0.180	0.406	0.287	0.119
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2	0.733	0.713	0.020	0.441	0.428	0.013
		5x3x5/16	7416	156.2	0.729	0.711	0.018	0.438	0.427	0.012
5	V	14x8 I-43	7384	200	0.920	0.689	0.232	0.567	0.413	0.153
5	HT	14-H-87	7354	240	0.682	0.472	0.210	0.422	0.283	0.139
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240						
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.442	1.004	0.438	0.891	0.602	0.289
6	HT	14-H-87	7355	240	0.593	0.188	0.405	0.380	0.113	0.267
6	HB	14-H-78	7367	240	1.327	1.089	0.237	0.810	0.653	0.156
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200	0.769	0.727	0.042	0.464	0.436	0.028
7	HT	14-H-87	7356	240	0.566	0.188	0.388	0.369	0.113	0.256
7	HB	14-H-78	7368	240	1.390	1.092	0.298	0.852	0.655	0.197
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.423	0.993	0.430	0.880	0.596	0.284
8	HT	14-H-87	7357	240	0.664	0.460	0.204	0.411	0.276	0.135
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240						
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200	0.890	0.658	0.232	0.548	0.395	0.153
9	HT	14-H-87	7358	240	0.640	0.480	0.159	0.393	0.288	0.105
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2	0.799	0.782	0.017	0.480	0.469	0.011
		5x3x5/16	7422	156.2	0.801	0.785	0.016	0.482	0.471	0.011
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.579	0.496	0.083	0.352	0.298	0.055
10	HT	14-H-87	7359	240	0.713	0.535	0.178	0.438	0.321	0.117
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	1.041	0.765	0.276	0.641	0.459	0.182
11	HT	14-H-87	7360	240	0.747	0.561	0.186	0.459	0.337	0.123
11	HB	14-H-78	7372	240	0.609	0.381	0.228	0.379	0.229	0.150
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200	0.637	0.544	0.093	0.388	0.326	0.061
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.532	0.498	0.034	0.321	0.299	0.022
	top+bot	Laced								
12	D1	7x4x3/8	7427	156.2						
		7x4x3/8	7428	156.2						
12	D2	7x4x3/8	7429	156.2						
		7x4x3/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192	0.736	0.689	0.047	0.444	0.413	0.031
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192	0.554	0.537	0.017	0.333	0.322	0.011
	4E	14-I-142	7380	192	0.943	0.664	0.279	0.583	0.398	0.184
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7	0.788	0.715	0.070	0.475	0.429	0.046
		7x4x5/8	7401	153.7	0.779	0.718	0.061	0.471	0.431	0.040
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7	0.840	0.785	0.056	0.508	0.471	0.037
		7x4x5/8	7399	153.7	0.852	0.787	0.065	0.515	0.472	0.043
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
West End	1W	14-H-87	7394	192						
	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192	0.880	0.865	0.015	0.529	0.519	0.010
	4W	14-I-142	7392	192	0.730	0.571	0.159	0.448	0.343	0.105
	5W	7x4x5/8	7431	153.7	0.844	0.769	0.075	0.511	0.461	0.050
		7x4x5/8	7432	153.7	0.857	0.772	0.085	0.519	0.463	0.056
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.711	0.637	0.074	0.431	0.382	0.049
		7x4x5/8	7436	153.7	0.706	0.639	0.068	0.428	0.383	0.045
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center Column	CC	33-I-200	7397	384	0.796	0.721	0.076	0.483	0.433	0.050
Total Overstressed Members					7			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles unless Otherwise Noted

Table 5.19. Truss T3 Hangars 44 and 45 Stepped Wind Loading, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240								
2	D1	14x12 I-78	7411	312.4			fa>Fe			1.130		
3	V	14x10 I-61	7382	200								
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.859	0.574	0.285	0.491	0.302	0.188
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.922		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	1.646	0.790	0.856	0.978	0.413	0.565
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2								
		5x3x5/16	7414	156.2								
4	D2	5x3x5/16	7415	156.2								
		5x3x5/16	7416	156.2								
5	V	14x8 I-43	7384	200								
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.424		
6	V	14x10 I-61	7385	200	1.072	2.445	0.604	0.428	0.177	0.344	0.227	0.117
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240	1.000	2.478	0.854	0.524	0.330	0.494	0.276	0.218
6	D2	14x12 I-78	7418	312.4			fa>Fe			1.204		
7	V	33-I-200	7386	200								
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240	1.000	2.478	0.694	0.519	0.175	0.389	0.273	0.116
7	D1	14x12 I-78	7419	312.4			fa>Fe			1.193		
8	V	14x10 I-61	7387	200								
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.405		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200								
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	1.646	0.790	0.856	0.978	0.413	0.565
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2								
		5x3x5/16	7422	156.2								
9	D2	5x3x5/16	7423	156.2								
		5x3x5/16	7424	156.2								
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.859	0.574	0.285	0.491	0.302	0.188
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.792		
11	V	14x10 I-61	7390	200	1.072	2.445	0.701	0.479	0.222	0.401	0.254	0.147
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	1.559	0.819	0.739	0.919	0.431	0.488
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.891		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192	1.000	3.982	0.503	0.470	0.033	0.282	0.261	0.022
	4E	14-I-142	7380	192								
	5E	7x4x5/8	7407	153.7	1.000	2.236	1.064	0.987	0.068	0.578	0.533	0.045
		7x4x5/8	7408	153.7	1.000	2.236	1.177	0.999	0.178	0.657	0.540	0.117
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	1.011	0.920	0.092	0.558	0.497	0.061
		7x4x5/8	7406	153.7	1.000	2.236	1.105	0.923	0.182	0.619	0.499	0.120
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
West End	1W	14-H-87	7394	192	1.000	3.696	0.785	0.718	0.067	0.440	0.396	0.044
	2W	14-H-87	7395	192	1.000	3.696	0.552	0.418	0.134	0.319	0.231	0.088
	3W	14-I-142	7391	192								
	4W	14-I-142	7392	192								
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.949	0.870	0.079	0.522	0.470	0.052
		7x4x5/8	7434	153.7	1.000	2.236	1.029	0.874	0.156	0.575	0.472	0.103
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.941	0.849	0.091	0.519	0.459	0.060
		7x4x5/8	7438	153.7	1.000	2.236	1.019	0.853	0.166	0.570	0.461	0.110
	9W	7x4x5/8	7375	240								
Center Colum	CC	33-I-200	7397	384								
Total Overstressed Members							17			5		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles unless Otherwise noted

Table 5.20. Hangars 44 and 45 Truss T3 Average Wind Loading, Tension.

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x3/8	7402	156.2						
		7x4x3/8	7403	156.2						
1	D2	7x4x3/8	7409	156.2						
		7x4x3/8	7410	156.2						
2	V	14-I-142	7381	200	0.531	0.461	0.070	0.323	0.277	0.046
2	HT	14-H-87	7351	240						
2	HB	14-H-78	7363	240	0.532	0.420	0.112	0.326	0.252	0.074
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	0.904	0.680	0.224	0.556	0.408	0.148
3	HT	14-H-87	7352	240	0.508	0.349	0.159	0.314	0.209	0.105
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.576	0.504	0.072	0.350	0.302	0.048
4	HT	14-H-87	7353	240						
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2						
		5x3x5/16	7416	156.2						
5	V	14x8 I-43	7384	200	0.785	0.629	0.156	0.480	0.377	0.103
5	HT	14-H-87	7354	240						
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240						
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.179	0.854	0.325	0.727	0.512	0.215
6	HT	14-H-87	7355	240						
6	HB	14-H-78	7367	240	0.919	0.730	0.189	0.563	0.438	0.125
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200	0.591	0.591	0.000	0.355	0.355	0.000
7	HT	14-H-87	7356	240						
7	HB	14-H-78	7368	240	0.919	0.730	0.189	0.563	0.438	0.125
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.179	0.854	0.325	0.727	0.512	0.215
8	HT	14-H-87	7357	240						
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240						
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
9	V	14x8 I-43	7388	200	0.785	0.629	0.156	0.480	0.377	0.103
9	HT	14-H-87	7358	240						
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2						
		5x3x5/16	7422	156.2						
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.576	0.504	0.072	0.350	0.302	0.048
10	HT	14-H-87	7359	240	0.508	0.349	0.159	0.314	0.209	0.105
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	0.904	0.680	0.224	0.556	0.408	0.148
11	HT	14-H-87	7360	240						
11	HB	14-H-78	7372	240						
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200	0.531	0.461	0.070	0.323	0.277	0.046
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.571	0.444	0.127	0.350	0.266	0.084
	top+bot	Laced								
12	D1	7x4x3/8	7427	156.2						
		7x4x3/8	7428	156.2						
12	D2	7x4x3/8	7429	156.2						
		7x4x3/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192						
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192						
	4E	14-I-142	7380	192	0.538	0.447	0.091	0.328	0.268	0.060
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7						
		7x4x5/8	7401	153.7						
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7						
		7x4x5/8	7399	153.7						
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
West End	1W	14-H-87	7394	192						
	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192	0.563	0.499	0.065	0.342	0.299	0.043
	4W	14-I-142	7392	192	0.538	0.447	0.091	0.328	0.268	0.060
	5W	7x4x5/8	7431	153.7	0.736	0.674	0.062	0.445	0.404	0.041
		7x4x5/8	7432	153.7	0.754	0.677	0.077	0.457	0.406	0.051
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.609	0.557	0.052	0.369	0.334	0.034
		7x4x5/8	7436	153.7	0.620	0.560	0.061	0.376	0.336	0.040
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center Column	CC	33-I-200	7397	384	0.559	0.559	0.000	0.335	0.335	0.000
Total Overstressed Members					2			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 5.21. Hangars 44 and 45 Truss T3 Average Wind Loading, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240	1.000	2.478	0.583	0.322	0.261	0.342	0.170	0.172
2	D1	14x12 I-78	7411	312.4			fa>Fe			0.710		
3	V	14x10 I-61	7382	200	1.072	2.445	0.602	0.438	0.164	0.341	0.232	0.108
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.649	0.449	0.200	0.369	0.237	0.132
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.649		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	1.066	0.625	0.441	0.618	0.327	0.291
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2								
		5x3x5/16	7414	156.2								
4	D2	5x3x5/16	7415	156.2								
		5x3x5/16	7416	156.2								
5	V	14x8 I-43	7384	200								
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.054		
6	V	14x10 I-61	7385	200	1.072	2.445	0.913	0.604	0.308	0.524	0.320	0.203
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240	1.000	2.478	1.334	0.767	0.567	0.778	0.404	0.374
6	D2	14x12 I-78	7418	312.4			fa>Fe			0.923		
7	V	33-I-200	7386	200	1.856	3.560	0.550	0.550	0.000	0.289	0.289	0.000
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240	1.000	2.478	1.334	0.767	0.567	0.778	0.404	0.374
7	D1	14x12 I-78	7419	312.4			fa>Fe			0.923		
8	V	14x10 I-61	7387	200	1.072	2.445	0.913	0.604	0.308	0.524	0.320	0.203
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.054		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200								
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	1.066	0.625	0.441	0.618	0.327	0.291
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2								
		5x3x5/16	7422	156.2								
9	D2	5x3x5/16	7423	156.2								
		5x3x5/16	7424	156.2								
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.649	0.449	0.200	0.369	0.237	0.132
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.649		
11	V	14x10 I-61	7390	200	1.072	2.445	0.602	0.438	0.164	0.341	0.232	0.108
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	0.888	0.539	0.349	0.514	0.284	0.230
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.710		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192	1.000	3.982	0.970	0.783	0.187	0.558	0.434	0.123
	4E	14-I-142	7380	192	3.792	3.982	0.654	0.558	0.095	0.354	0.291	0.063
	5E	7x4x5/8	7407	153.7	1.000	2.236	0.750	0.697	0.053	0.412	0.377	0.035
		7x4x5/8	7408	153.7	1.000	2.236	0.813	0.700	0.112	0.452	0.378	0.074
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	0.647	0.595	0.052	0.356	0.321	0.034
		7x4x5/8	7406	153.7	1.000	2.236	0.717	0.599	0.118	0.402	0.324	0.078
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
West End	1W	14-H-87	7394	192	1.000	3.696	1.043	0.794	0.249	0.602	0.438	0.164
	2W	14-H-87	7395	192	1.000	3.696	0.537	0.353	0.184	0.316	0.195	0.121
	3W	14-I-142	7391	192	3.792	3.982	0.535	0.514	0.021	0.282	0.268	0.014
	4W	14-I-142	7392	192	3.792	3.982	0.654	0.558	0.095	0.354	0.291	0.063
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.658	0.610	0.047	0.361	0.330	0.031
		7x4x5/8	7434	153.7	1.000	2.236	0.706	0.615	0.091	0.392	0.332	0.060
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.841	0.779	0.062	0.462	0.421	0.041
		7x4x5/8	7438	153.7	1.000	2.236	0.916	0.783	0.133	0.511	0.423	0.088
	9W	7x4x5/8	7375	240								
Center Colum	CC	33-I-200	7397	384								
Total Overstressed Members							13			2		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 5.22. Hangars 43, 47, 44, and 45 Truss SF Type I No Infill Struts, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V1	18-I-64	3	170						
1	VM	2 Z 4x3	7594	85						
1		2 Z 4x3	7595	85						
1	HT	5x5x3/8	7582	120						
1		5x5x3/8	7583	120						
1	HB	1 C 10-20	7580	120	0.643	0.527	0.116	0.393	0.316	0.077
1		L 3x2x1/4	7581	120	0.628	0.523	0.105	0.383	0.314	0.069
1	HM1	L 3x2x1/4	7592	60						
1	HM2	L 3x2x1/4	7593	60						
1	D1A	L 3x21/2x1/4	7586	104						
1		L 3x21/2x1/4	7587	104						
1	D2A	L 3x21/2x1/4	7584	104						
1		L 3x21/2x1/4	7585	104						
1	D1B	L 3x21/2x1/4	7590	104						
1		L 3x21/2x1/4	7591	104						
1	D2B	L 3x21/2x1/4	7588	104						
1		L 3x21/2x1/4	7589	104						
1	V2	18-I-64	2	161						
		18-I-64	113	43						
1	V3	18-I-64	1	181						
1	H	12-I-40	7821	240						
1	H2	10-I-21	101	240	0.545	0.000	0.545	0.360	0.000	0.360
1	D1C	5x3x5/16	7561	157	fa>Fe					
1		5x3x5/16	7562	157	fa>Fe					
1	D2C	6x3.5x3/8	7559	157	0.632	0.583	0.049	0.382	0.350	0.032
1		6x3.5x3/8	7560	157	0.621	0.586	0.034	0.374	0.352	0.022
1	D1D	5x3x5/16	7557	157	fa>Fe					
1		5x3x5/16	7558	157	fa>Fe					
1	D2D	6x3.5x3/8	7555	157	0.798	0.756	0.042	0.481	0.454	0.028
1		6x3.5x3/8	7556	157	0.792	0.759	0.033	0.477	0.455	0.022
2	V1	18-I-85	6	170						
2	VM	2 Z 4x3	7614	85						
2		2 Z 4x3	7615	85						
2	HT	5x5x3/8	7602	120						
2		5x5x3/8	7603	120						
2	HB	1 C 10-15.3	7600	120						
2		L 3x2x1/4	7601	120						
2	HM1	L 3x2x1/4	7612	60						
2	HM2	L 3x2x1/4	7613	60						
2	D1A	L 3x21/2x1/4	7606	104						
2		L 3x21/2x1/4	7607	104						
2	D2A	L 3x21/2x1/4	7604	104						
2		L 3x21/2x1/4	7605	104						
2	D1B	L 3x21/2x1/4	7610	104						
2		L 3x21/2x1/4	7611	104						
2	D2B	L 3x21/2x1/4	7608	104						
2		L 3x21/2x1/4	7609	104						
2	V2	18-I-85	5	161						
		18-I-85	114	43						
2	V3	18-I-85	4	181						
2	H2	10-I-21	102	240						
2	H	C 8-11.5	7822	240						
		12 - I - 25								

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
3	V1	18-I-85	9	170						
3	VM	2 Z 4x3	7634	85						
3		2 Z 4x3	7635	85						
3	HT	5x5x3/8	7622	120						
3		5x5x3/8	7623	120						
3	HB	1 C 10-15.3	7620	120						
3		L 3x2x1/4	7621	120						
3	HM1	L 3x2x1/4	7632	60						
3	HM2	L 3x2x1/4	7633	60						
3	D1A	L 3x21/2x1/4	7626	104						
3		L 3x21/2x1/4	7627	104						
3	D2A	L 3x21/2x1/4	7624	104						
3		L 3x21/2x1/4	7625	104						
3	D1B	L 3x21/2x1/4	7630	104						
3		L 3x21/2x1/4	7631	104						
3	D2B	L 3x21/2x1/4	7628	104						
3		L 3x21/2x1/4	7629	104						
3	V2	18-I-85	8	161						
3		18-I-85	115	43						
3	V3	18-I-85	7	181						
3	H2	10-I-21	103	240						
3	H	14-I-30	7823	240						
4	V1	18-I-85	12	170						
4	VM	2 Z 4x3	7654	85						
4		2 Z 4x3	7655	85						
4	HT	5x5x3/8	7642	120						
4		5x5x3/8	7643	120						
4	HB	1 C 10-15.3	7640	120						
4		L 3x2x1/4	7641	120						
4	HM1	L 3x2x1/4	7652	60						
4	HM2	L 3x2x1/4	7653	60						
4	D1A	L 3x21/2x1/4	7646	104						
4		L 3x21/2x1/4	7647	104						
4	D2A	L 3x21/2x1/4	7644	104						
4		L 3x21/2x1/4	7645	104						
4	D1B	L 3x21/2x1/4	7650	104						
4		L 3x21/2x1/4	7651	104						
4	D2B	L 3x21/2x1/4	7648	104						
4		L 3x21/2x1/4	7649	104						
4	V2	18-I-85	11	161						
4		18-I-85	116	43						
4	V3	18-I-85	10	181						
4	H2	10-I-21	104	240						
4	H	C 8-11.5	7824	240						
		12 - I - 25								

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
5	V1	18-I-85	15	170						
5	VM	2 Z 4x3	7674	85						
5		2 Z 4x3	7675	85						
5	HT	5x5x3/8	7662	120						
5		5x5x3/8	7663	120						
5	HB	1 C 10-15.3	7660	120						
5		L 3x2x1/4	7661	120						
5	HM1	L 3x2x1/4	7672	60						
5	HM2	L 3x2x1/4	7673	60						
5	D1A	L 3x21/2x1/4	7666	104						
5		L 3x21/2x1/4	7667	104						
5	D2A	L 3x21/2x1/4	7664	104						
5		L 3x21/2x1/4	7665	104						
5	D1B	L 3x21/2x1/4	7670	104						
5		L 3x21/2x1/4	7671	104						
5	D2B	L 3x21/2x1/4	7668	104						
5		L 3x21/2x1/4	7669	104						
5	V2	18-I-85	14	161						
5		18-I-85	117	43						
5	V3	18-I-85	13	181						
5		10-I-21	105	240						
5	H	C 8-11.5	7825	240						
		12 - I - 25								
6	V1	18-I-85	18	170						
6	VM	2 Z 4x3	7694	85						
6		2 Z 4x3	7695	85						
6	HT	5x5x3/8	7682	120						
6		5x5x3/8	7683	120						
6	HB	1 C 10-15.3	7680	120						
6		L 3x2x1/4	7681	120						
6	HM1	L 3x2x1/4	7692	60						
6	HM2	L 3x2x1/4	7693	60						
6	D1A	L 3x21/2x1/4	7686	104						
6		L 3x21/2x1/4	7687	104						
6	D2A	L 3x21/2x1/4	7684	104						
6		L 3x21/2x1/4	7685	104						
6	D1B	L 3x21/2x1/4	7690	104						
6		L 3x21/2x1/4	7691	104						
6	D2B	L 3x21/2x1/4	7688	104						
6		L 3x21/2x1/4	7689	104						
6	V2	18-I-85	17	161						
6		18-I-85	118	43						
6	V3	18-I-85	16	181						
6	H2	10-I-21	106	240						
6	H	12-I-40	7826	240						
6	D1C	L 5x3x5/16	7569	157	0.683	0.621	0.062	0.414	0.373	0.041
6		L 5x3x5/16	7570	157	0.676	0.615	0.061	0.409	0.369	0.040
6	D2C	L 5x3x5/16	7567	157	fa>Fe					
6		L 5x3x5/16	7568	157	fa>Fe					
6	D1D	L 5x3x5/16	7565	157	fa>Fe					
6		L 5x3x5/16	7566	157	fa>Fe					
6	D2D	L 5x3x5/16	7563	157	fa>Fe					
6		L 5x3x5/16	7564	157	fa>Fe					

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
7	V1	18-I-85	21	170						
7	VM	2 Z 4x3	7714	85						
7		2 Z 4x3	7715	85						
7	HT	5x5x3/8	7702	120						
7		5x5x3/8	7703	120						
7	HB	1 C 10-15.3	7700	120	0.565	0.418	0.148	0.348	0.251	0.098
7		L 3x2x1/4	7701	120	0.506	0.392	0.114	0.310	0.235	0.075
7	HM1	L 3x2x1/4	7712	60						
7	HM2	L 3x2x1/4	7713	60						
7	D1A	L 3x21/2x1/4	7706	104						
7		L 3x21/2x1/4	7707	104						
7	D2A	L 3x21/2x1/4	7704	104						
7		L 3x21/2x1/4	7705	104						
7	D1B	L 3x21/2x1/4	7710	104						
7		L 3x21/2x1/4	7711	104						
7	D2B	L 3x21/2x1/4	7708	104						
7		L 3x21/2x1/4	7709	104						
7	V2	18-I-85	20	161						
7		18-I-85	119	43						
7	V3	18-I-85	19	181						
7	H2	10+-I-21	107	240						
7	H	C 8-11.5	7827	240						
		12 - I - 25								
8	V1	18-I-85	24	170						
8	VM	2 Z 4x3	7734	85						
8		2 Z 4x3	7735	85						
8	HT	5x5x3/8	7722	120						
8		5x5x3/8	7723	120						
8	HB	1 C 10-15.3	7720	120	0.521	0.380	0.141	0.321	0.228	0.093
8		L 3x2x1/4	7721	120						
8	HM1	L 3x2x1/4	7732	60						
8	HM2	L 3x2x1/4	7733	60						
8	D1A	L 3x21/2x1/4	7726	104						
8		L 3x21/2x1/4	7727	104						
8	D2A	L 3x21/2x1/4	7724	104						
8		L 3x21/2x1/4	7725	104						
8	D1B	L 3x21/2x1/4	7730	104						
8		L 3x21/2x1/4	7731	104						
8	D2B	L 3x21/2x1/4	7728	104						
8		L 3x21/2x1/4	7729	104						
8	V2	18-I-85	23	161						
8		18-I-85	120	43						
8	V3	18-I-85	22	181						
8	H2	10I-21	108	240						
8	H	C 8-11.5	7828	240						
		12 - I - 25								

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V1	18-I-85	27	170						
9	VM	2 Z 4x3	7754	85						
9		2 Z 4x3	7755	85						
9	HT	5x5x3/8	7742	120						
9		5x5x3/8	7743	120						
9	HB	1 C 10-15.3	7740	120	0.517	0.376	0.141	0.319	0.226	0.093
9		L 3x2x1/4	7741	120						
9	HM1	L 3x2x1/4	7752	60						
9	HM2	L 3x2x1/4	7753	60						
9	D1A	L 3x21/2x1/4	7746	104						
9		L 3x21/2x1/4	7747	104						
9	D2A	L 3x21/2x1/4	7744	104						
9		L 3x21/2x1/4	7745	104						
9	D1B	L 3x21/2x1/4	7750	104						
9		L 3x21/2x1/4	7751	104						
9	D2B	L 3x21/2x1/4	7748	104						
9		L 3x21/2x1/4	7749	104						
9	V2	18-I-85	26	161						
9		18-I-85	121	43						
9	V3	18-I-85	25	181						
9	H2	10-I-21	109	240						
9	H	C 8-11.5	7829	240						
		12 - I - 25								
10	V1	18-I-85	30	170						
10	VM	2 Z 4x3	7774	85						
10		2 Z 4x3	7775	85						
10	HT	5x5x3/8	7762	120						
10		5x5x3/8	7763	120						
10	HB	1 C 10-15.3	7760	120	0.532	0.384	0.148	0.328	0.230	0.098
10		L 3x2x1/4	7761	120						
10	HM1	L 3x2x1/4	7772	60						
10	HM2	L 3x2x1/4	7773	60						
10	D1A	L 3x21/2x1/4	7766	104						
10		L 3x21/2x1/4	7767	104						
10	D2A	L 3x21/2x1/4	7764	104						
10		L 3x21/2x1/4	7765	104						
10	D1B	L 3x21/2x1/4	7770	104						
10		L 3x21/2x1/4	7771	104						
10	D2B	L 3x21/2x1/4	7768	104						
10		L 3x21/2x1/4	7769	104						
10	V2	18-I-85	29	161						
10		18-I-85	122	43						
10	V3	18-I-85	28	181						
10	H2	10-I-21	110	240						
10	H	14-I-30	7830	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed: Stress Ratio	Computed: AXL	Computed: B22	No FOS *: Stress Ratio	No FOS *: AXL	No FOS *: B22
11	V1	18-I-85	34	170						
11	VM	2 Z 4x3	7794	85						
11		2 Z 4x3	7795	85						
11	HT	5x5x3/8	7782	120						
11		5x5x3/8	7783	120						
11	HB	1 C 10-15.3	7780	120	0.547	0.383	0.164	0.338	0.230	0.108
11		L 3x2x1/4	7781	120						
11	HM1	L 3x2x1/4	7792	60						
11	HM2	L 3x2x1/4	7793	60						
11	D1A	L 3x21/2x1/4	7786	104						
11		L 3x21/2x1/4	7787	104						
11	D2A	L 3x21/2x1/4	7784	104						
11		L 3x21/2x1/4	7785	104						
11	D1B	L 3x21/2x1/4	7790	104						
11		L 3x21/2x1/4	7791	104						
11	D2B	L 3x21/2x1/4	7788	104						
11		L 3x21/2x1/4	7789	104						
11	V2	18-I-85	33	161						
11		18-I-85	123	43						
11	V3	18-I-85	32	97	1.242	0.128	1.115	0.813	0.077	0.736
11		18-I-85	31	84	1.260	0.146	1.115	0.824	0.088	0.736
11	H2	10-I-21	111	240	0.533	0.000	0.533	0.352	0.000	0.352
11	H	12-I-40	7831	240						
11	D1D	6x31/2x5/16	7573	140						
11		6x31/2x5/16	7574	140						
11	D2D	5x3x5/16	7571	140						
11		5x3x5/16	7572	140						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
12	V1	18-I-85	38	170						
12	VM	2 Z 4x3	7814	85						
12		2 Z 4x3	7815	85						
12	HT	5x5x3/8	7802	120						
12		5x5x3/8	7803	120						
12	HB	1 C 10-20	7800	120	0.593	0.493	0.100	0.362	0.296	0.066
12		L 3x2x1/4	7801	120	0.670	0.524	0.146	0.411	0.314	0.096
12	HM1	L 3x2x1/4	7812	60						
12	HM2	L 3x2x1/4	7813	60						
12	D1A	L 3x21/2x1/4	7806	104						
12		L 3x21/2x1/4	7807	104						
12	D2A	L 3x21/2x1/4	7804	104						
12		L 3x21/2x1/4	7805	104						
12	D1B	L 3x21/2x1/4	7810	104						
12		L 3x21/2x1/4	7811	104						
12	D2B	L 3x21/2x1/4	7808	104						
12		L 3x21/2x1/4	7809	104						
12	V2	18-I-85	37	161						
12		18-I-85	124	43	0.525	0.169	0.356	0.336	0.101	0.235
12	V3	18-I-85	36	97						
12		18-I-85	35	84						
12	H2	10-I-21	112	240	0.549	0.000	0.549	0.362	0.000	0.362
12	H	12-I-40	7832	240						
12	D1C	6x31/2x3/8	7577	157						
12		6x31/2x3/8	7578	157						
12	D2C	5x3x5/16	7575	157	0.619	0.588	0.031	0.373	0.353	0.020
12		5x3x5/16	7576	157	0.650	0.592	0.058	0.393	0.355	0.038
END	EV1	18-I-64	41	170						
	EV2	18-I-64	40	161						
		18-I-64	125	43						
	EV3	18-I-64	39	181						
		Total Overstressed Members			12			10		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.23. Hangars 43, 47, 44, and 45 Truss SF Type I No Infill Struts, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
1	V1	18-I-64	3	170								
1	VM	2 Z 4x3	7594	85								
1		2 Z 4x3	7595	85								
1	HT	5x5x3/8	7582	120								
1		5x5x3/8	7583	120								
1	HB	1 C 10-20	7580	120	1.000	0.927	1.041	0.672	0.368	0.593	0.351	0.243
1		L 3x2x1/4	7581	120	1.000	0.927	1.045	0.680	0.365	0.596	0.355	0.241
1	HM1	L 3x2x1/4	7592	60								
1	HM2	L 3x2x1/4	7593	60								
1	D1A	L 3x21/2x1/4	7586	104								
1		L 3x21/2x1/4	7587	104								
1	D2A	L 3x21/2x1/4	7584	104								
1		L 3x21/2x1/4	7585	104								
1	D1B	L 3x21/2x1/4	7590	104								
1		L 3x21/2x1/4	7591	104								
1	D2B	L 3x21/2x1/4	7588	104								
1		L 3x21/2x1/4	7589	104								
1	V2	18-I-64	2	161								
		18-I-64	113	43	1.000	1.694	0.523	0.073	0.451	0.340	0.042	0.298
1	V3	18-I-64	1	181	1.000	1.694	0.673	0.592	0.082	0.364	0.310	0.054
1	H	12-I-40	7821	240								
1	H2	10-I-21	101	240								
1	D1C	5x3x5/16	7561	157			fa>Fe					
1		5x3x5/16	7562	157			fa>Fe					
1	D2C	6x3.5x3/8	7559	157	1.000	1.389	1.098	1.044	0.054	0.581	0.546	0.036
1		6x3.5x3/8	7560	157	1.000	1.389	1.087	1.038	0.049	0.575	0.543	0.032
1	D1D	5x3x5/16	7557	157			fa>Fe					
1		5x3x5/16	7558	157			fa>Fe					
1	D2D	6x3.5x3/8	7555	157	1.000	1.389	1.294	1.224	0.070	0.686	0.640	0.046
1		6x3.5x3/8	7556	157	1.000	1.389	1.317	1.218	0.099	0.702	0.637	0.065
2	V1	18-I-85	6	170								
2	VM	2 Z 4x3	7614	85								
2		2 Z 4x3	7615	85								
2	HT	5x5x3/8	7602	120								
2		5x5x3/8	7603	120								
2	HB	1 C 10-15.3	7600	120			fa>Fe					
2		L 3x2x1/4	7601	120	1.000	1.016	2.037	0.856	1.181	1.226	0.447	0.779
2	HM1	L 3x2x1/4	7612	60								
2	HM2	L 3x2x1/4	7613	60								
2	D1A	L 3x21/2x1/4	7606	104	1.000	0.753	0.741	0.709	0.032	0.391	0.370	0.021
2		L 3x21/2x1/4	7607	104	1.000	0.753	0.692	0.659	0.033	0.366	0.344	0.022
2	D2A	L 3x21/2x1/4	7604	104	1.000	0.753	1.377	1.219	0.158	0.740	0.636	0.104
2		L 3x21/2x1/4	7605	104	1.000	0.753	1.075	1.003	0.072	0.571	0.523	0.048
2	D1B	L 3x21/2x1/4	7610	104	1.000	0.753	1.033	0.982	0.052	0.547	0.512	0.034
2		L 3x21/2x1/4	7611	104	1.000	0.753	1.058	0.997	0.061	0.560	0.520	0.040
2	D2B	L 3x21/2x1/4	7608	104	1.000	0.753	0.594	0.553	0.041	0.316	0.289	0.027
2		L 3x21/2x1/4	7609	104	1.000	0.753	1.196	1.128	0.068	0.633	0.589	0.045
2	V2	18-I-85	5	161								
		18-I-85	114	43								
2	V3	18-I-85	4	181								
2	H2	10-I-21	102	240	1.000	1.325	0.639	0.189	0.450	0.396	0.099	0.297
2	H	C 8-11.5	7822	240								
		12 - I - 25										

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
3	V1	18-I-85	9	170								
3	VM	2 Z 4x3	7634	85								
3		2 Z 4x3	7635	85								
3	HT	5x5x3/8	7622	120								
3		5x5x3/8	7623	120								
3	HB	1 C 10-15.3	7620	120	1.000	1.016	0.927	0.679	0.248	0.518	0.355	0.164
3		L 3x2x1/4	7621	120	1.000	1.016	0.914	0.580	0.334	0.523	0.303	0.220
3	HM1	L 3x2x1/4	7632	60								
3	HM2	L 3x2x1/4	7633	60								
3	D1A	L 3x21/2x1/4	7626	104								
3		L 3x21/2x1/4	7627	104								
3	D2A	L 3x21/2x1/4	7624	104	1.000	0.753	0.828	0.767	0.061	0.440	0.400	0.040
3		L 3x21/2x1/4	7625	104								
3	D1B	L 3x21/2x1/4	7630	104								
3		L 3x21/2x1/4	7631	104	1.000	0.753	0.583	0.541	0.041	0.309	0.282	0.027
3	D2B	L 3x21/2x1/4	7628	104								
3		L 3x21/2x1/4	7629	104	1.000	0.753	0.536	0.508	0.028	0.284	0.265	0.018
3	V2	18-I-85	8	161								
3		18-I-85	115	43								
3	V3	18-I-85	7	181								
3	H2	10-I-21	103	240	1.000	1.325	0.874	0.576	0.298	0.497	0.301	0.197
3	H	14-I-30	7823	240								
4	V1	18-I-85	12	170								
4	VM	2 Z 4x3	7654	85								
4		2 Z 4x3	7655	85								
4	HT	5x5x3/8	7642	120								
4		5x5x3/8	7643	120								
4	HB	1 C 10-15.3	7640	120	1.000	1.016	0.687	0.504	0.182	0.383	0.263	0.120
4		L 3x2x1/4	7641	120	1.000	1.016	0.666	0.424	0.242	0.381	0.221	0.160
4	HM1	L 3x2x1/4	7652	60								
4	HM2	L 3x2x1/4	7653	60								
4	D1A	L 3x21/2x1/4	7646	104	1.000	0.753	0.576	0.551	0.025	0.304	0.287	0.017
4		L 3x21/2x1/4	7647	104								
4	D2A	L 3x21/2x1/4	7644	104								
4		L 3x21/2x1/4	7645	104								
4	D1B	L 3x21/2x1/4	7650	104								
4		L 3x21/2x1/4	7651	104	1.000	0.753	0.683	0.637	0.047	0.363	0.332	0.031
4	D2B	L 3x21/2x1/4	7648	104								
4		L 3x21/2x1/4	7649	104								
4	V2	18-I-85	11	161								
4		18-I-85	116	43								
4	V3	18-I-85	10	181								
4	H2	10-I-21	104	240	1.000	1.325	0.653	0.289	0.363	0.390	0.151	0.240
4	H	C 8-11.5	7824	240								
		12 - I - 25										

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
5	V1	18-I-85	15	170								
5	VM	2 Z 4x3	7674	85								
5		2 Z 4x3	7675	85								
5	HT	5x5x3/8	7662	120								
5		5x5x3/8	7663	120								
5	HB	1 C 10-15.3	7660	120	1.000	1.016	0.744	0.477	0.267	0.425	0.249	0.176
5		L 3x2x1/4	7661	120	1.000	1.016	0.760	0.568	0.192	0.423	0.297	0.127
5	HM1	L 3x2x1/4	7672	60								
5	HM2	L 3x2x1/4	7673	60								
5	D1A	L 3x21/2x1/4	7666	104	1.000	0.753	0.642	0.613	0.029	0.339	0.320	0.019
5		L 3x21/2x1/4	7667	104								
5	D2A	L 3x21/2x1/4	7664	104	1.000	0.753	0.557	0.523	0.033	0.295	0.273	0.022
5		L 3x21/2x1/4	7665	104								
5	D1B	L 3x21/2x1/4	7670	104	1.000	0.753	0.561	0.529	0.032	0.297	0.276	0.021
5		L 3x21/2x1/4	7671	104	1.000	0.753	0.761	0.709	0.052	0.404	0.370	0.034
5	D2B	L 3x21/2x1/4	7668	104								
5		L 3x21/2x1/4	7669	104								
5	V2	18-I-85	14	161								
5		18-I-85	117	43								
5	V3	18-I-85	13	181								
5		10-I-21	105	240	1.000	1.325	1.085	0.724	0.360	0.615	0.378	0.238
5	H	C 8-11.5	7825	240								
		12 - I - 25										
6	V1	18-I-85	18	170								
6	VM	2 Z 4x3	7694	85								
6		2 Z 4x3	7695	85								
6	HT	5x5x3/8	7682	120								
6		5x5x3/8	7683	120								
6	HB	1 C 10-15.3	7680	120	1.000	1.016	0.737	0.516	0.220	0.415	0.269	0.145
6		L 3x2x1/4	7681	120	1.000	1.016	0.734	0.508	0.226	0.414	0.265	0.149
6	HM1	L 3x2x1/4	7692	60								
6	HM2	L 3x2x1/4	7693	60								
6	D1A	L 3x21/2x1/4	7686	104								
6		L 3x21/2x1/4	7687	104								
6	D2A	L 3x21/2x1/4	7684	104								
6		L 3x21/2x1/4	7685	104								
6	D1B	L 3x21/2x1/4	7690	104								
6		L 3x21/2x1/4	7691	104								
6	D2B	L 3x21/2x1/4	7688	104								
6		L 3x21/2x1/4	7689	104								
6	V2	18-I-85	17	161								
6		18-I-85	118	43								
6	V3	18-I-85	16	181								
6	H2	10-I-21	106	240	1.000	1.325	1.022	0.839	0.183	0.559	0.438	0.121
6	H	12-I-40	7826	240								
6	D1C	L 5x3x5/16	7569	157	1.000	0.854	3.822	3.230	0.592	2.076	1.685	0.391
6		L 5x3x5/16	7570	157	1.000	0.854	3.770	3.259	0.511	2.038	1.700	0.337
6	D2C	L 5x3x5/16	7567	157			fa>Fe					
6		L 5x3x5/16	7568	157			fa>Fe					
6	D1D	L 5x3x5/16	7565	157			fa>Fe					
6		L 5x3x5/16	7566	157			fa>Fe					
6	D2D	L 5x3x5/16	7563	157			fa>Fe					
6		L 5x3x5/16	7564	157			fa>Fe					

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed			No FOS *		
							Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
7	V1	18-I-85	21	170								
7	VM	2 Z 4x3	7714	85								
7		2 Z 4x3	7715	85								
7	HT	5x5x3/8	7702	120								
7		5x5x3/8	7703	120								
7	HB	1 C 10-15.3	7700	120			fa>Fe					
7		L 3x2x1/4	7701	120	1.000	1.016	3.187	0.946	2.240	1.972	0.494	1.478
7	HM1	L 3x2x1/4	7712	60								
7	HM2	L 3x2x1/4	7713	60								
7	D1A	L 3x21/2x1/4	7706	104								
7		L 3x21/2x1/4	7707	104								
7	D2A	L 3x21/2x1/4	7704	104	1.000	0.753	1.010	0.923	0.087	0.539	0.482	0.057
7		L 3x21/2x1/4	7705	104	1.000	0.753	0.525	0.493	0.032	0.278	0.257	0.021
7	D1B	L 3x21/2x1/4	7710	104								
7		L 3x21/2x1/4	7711	104	1.000	0.753	0.508	0.479	0.029	0.269	0.250	0.019
7	D2B	L 3x21/2x1/4	7708	104								
7		L 3x21/2x1/4	7709	104	1.000	0.753	0.634	0.605	0.029	0.335	0.316	0.019
7	V2	18-I-85	20	161								
7		18-I-85	119	43								
7	V3	18-I-85	19	181								
7	H2	10+-I-21	107	240	1.000	1.325	1.233	0.929	0.303	0.685	0.485	0.200
7	H	C 8-11.5	7827	240								
		12 - I - 25										
8	V1	18-I-85	24	170								
8	VM	2 Z 4x3	7734	85								
8		2 Z 4x3	7735	85								
8	HT	5x5x3/8	7722	120								
8		5x5x3/8	7723	120								
8	HB	1 C 10-15.3	7720	120	1.000	1.016	1.669	0.891	0.778	0.979	0.465	0.513
8		L 3x2x1/4	7721	120	1.000	1.016	1.567	0.836	0.731	0.919	0.437	0.482
8	HM1	L 3x2x1/4	7732	60								
8	HM2	L 3x2x1/4	7733	60								
8	D1A	L 3x21/2x1/4	7726	104								
8		L 3x21/2x1/4	7727	104								
8	D2A	L 3x21/2x1/4	7724	104	1.000	0.753	0.598	0.552	0.249	0.452	0.288	0.164
8		L 3x21/2x1/4	7725	104								
8	D1B	L 3x21/2x1/4	7730	104								
8		L 3x21/2x1/4	7731	104								
8	D2B	L 3x21/2x1/4	7728	104								
8		L 3x21/2x1/4	7729	104								
8	V2	18-I-85	23	161								
8		18-I-85	120	43								
8	V3	18-I-85	22	181								
8	H2	10I-21	108	240	1.000	1.325	1.291	0.935	0.356	0.723	0.488	0.235
8	H	C 8-11.5	7828	240								
		12 - I - 25										

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Stress Ratio (Computed)	AXL (Computed)	B22 (Computed)	Stress Ratio (No FOS *)	AXL (No FOS *)	B22 (No FOS *)
9	V1	18-I-85	27	170								
9	VM	2 Z 4x3	7754	85								
9		2 Z 4x3	7755	85								
9	HT	5x5x3/8	7742	120								
9		5x5x3/8	7743	120								
9	HB	1 C 10-15.3	7740	120	1.000	1.016	1.333	0.831	0.502	0.765	0.434	0.331
9		L 3x2x1/4	7741	120	1.000	1.016	1.305	0.772	0.534	0.756	0.403	0.352
9	HM1	L 3x2x1/4	7752	60								
9	HM2	L 3x2x1/4	7753	60								
9	D1A	L 3x21/2x1/4	7746	104								
9		L 3x21/2x1/4	7747	104								
9	D2A	L 3x21/2x1/4	7744	104	1.000	0.753	0.666	0.620	0.047	0.354	0.323	0.031
9		L 3x21/2x1/4	7745	104								
9	D1B	L 3x21/2x1/4	7750	104								
9		L 3x21/2x1/4	7751	104								
9	D2B	L 3x21/2x1/4	7748	104								
9		L 3x21/2x1/4	7749	104	1.000	0.753	0.557	0.532	0.026	0.295	0.278	0.017
9	V2	18-I-85	26	161								
9		18-I-85	121	43								
9	V3	18-I-85	25	181								
9	H2	10-I-21	109	240	1.000	1.325	1.273	0.880	0.393	0.719	0.459	0.259
9	H	C 8-11.5	7829	240								
		12 - I - 25										
10	V1	18-I-85	30	170								
10	VM	2 Z 4x3	7774	85								
10		2 Z 4x3	7775	85								
10	HT	5x5x3/8	7762	120								
10		5x5x3/8	7763	120								
10	HB	1 C 10-15.3	7760	120	1.000	1.016	1.318	0.809	0.509	0.758	0.422	0.336
10		L 3x2x1/4	7761	120	1.000	1.016	1.290	0.754	0.537	0.748	0.394	0.354
10	HM1	L 3x2x1/4	7772	60								
10	HM2	L 3x2x1/4	7773	60								
10	D1A	L 3x21/2x1/4	7766	104								
10		L 3x21/2x1/4	7767	104								
10	D2A	L 3x21/2x1/4	7764	104	1.000	0.753	0.574	0.531	0.043	0.305	0.277	0.028
10		L 3x21/2x1/4	7765	104								
10	D1B	L 3x21/2x1/4	7770	104								
10		L 3x21/2x1/4	7771	104	1.000	0.753	0.555	0.519	0.037	0.295	0.271	0.024
10	D2B	L 3x21/2x1/4	7768	104								
10		L 3x21/2x1/4	7769	104								
10	V2	18-I-85	29	161								
10		18-I-85	122	43								
10	V3	18-I-85	28	181								
10	H2	10-I-21	110	240	1.000	1.325	1.206	0.751	0.455	0.692	0.392	0.300
10	H	14-I-30	7830	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
11	V1	18-I-85	34	170								
11	VM	2 Z 4x3	7794	85								
11		2 Z 4x3	7795	85								
11	HT	5x5x3/8	7782	120								
11		5x5x3/8	7783	120								
11	HB	1 C 10-15.3	7780	120	1.000	1.016	1.288	0.793	0.495	0.741	0.414	0.327
11		L 3x2x1/4	7781	120	1.000	1.016	1.270	0.750	0.520	0.735	0.392	0.343
11	HM1	L 3x2x1/4	7792	60								
11	HM2	L 3x2x1/4	7793	60								
11	D1A	L 3x21/2x1/4	7786	104	1.000	0.753	0.577	0.542	0.035	0.306	0.283	0.023
11		L 3x21/2x1/4	7787	104								
11	D2A	L 3x21/2x1/4	7784	104	1.000	0.753	0.760	0.709	0.051	0.404	0.370	0.034
11		L 3x21/2x1/4	7785	104	1.000	0.753	0.656	0.623	0.033	0.347	0.325	0.022
11	D1B	L 3x21/2x1/4	7790	104	1.000	0.753	0.538	0.503	0.035	0.286	0.262	0.023
11		L 3x21/2x1/4	7791	104	1.000	0.753	0.667	0.623	0.044	0.354	0.325	0.029
11	D2B	L 3x21/2x1/4	7788	104	1.000	0.753	0.555	0.523	0.031	0.293	0.273	0.020
11		L 3x21/2x1/4	7789	104	1.000	0.753	0.626	0.598	0.028	0.330	0.312	0.018
11	V2	18-I-85	33	161								
11		18-I-85	123	43								
11	V3	18-I-85	32	97	1.000	2.611	1.096	0.038	1.058	0.720	0.021	0.698
11		18-I-85	31	84	1.000	7.723	1.116	0.059	1.058	0.733	0.035	0.698
11	H2	10-I-21	111	240	1.000	1.325	1.196	0.664	0.531	0.697	0.346	0.350
11	H	12-I-40	7831	240								
11	D1D	6x31/2x5/16	7573	140								
11		6x31/2x5/16	7574	140								
11	D2D	5x3x5/16	7571	140								
11		5x3x5/16	7572	140								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
12	V1	18-I-85	38	170								
12	VM	2 Z 4x3	7814	85								
12		2 Z 4x3	7815	85								
12	HT	5x5x3/8	7802	120								
12		5x5x3/8	7803	120								
12	HB	1 C 10-20	7800	120	1.000	0.927	3.931	0.959	2.972	2.462	0.500	1.962
12		L 3x2x1/4	7801	120	1.000	0.927	3.808	0.957	2.851	2.381	0.499	1.882
12	HM1	L 3x2x1/4	7812	60								
12	HM2	L 3x2x1/4	7813	60								
12	D1A	L 3x21/2x1/4	7806	104								
12		L 3x21/2x1/4	7807	104								
12	D2A	L 3x21/2x1/4	7804	104								
12		L 3x21/2x1/4	7805	104								
12	D1B	L 3x21/2x1/4	7810	104								
12		L 3x21/2x1/4	7811	104								
12	D2B	L 3x21/2x1/4	7808	104								
12		L 3x21/2x1/4	7809	104								
12	V2	18-I-85	37	161								
12		18-I-85	124	43								
12	V3	18-I-85	36	97								
12		18-I-85	35	84								
12	H2	10-I-21	112	240	1.000	1.325	0.503	0.151	0.353	0.312	0.079	0.233
12	H	12-I-40	7832	240								
12	D1C	6x31/2x3/8	7577	157								
12		6x31/2x3/8	7578	157								
12	D2C	5x3x5/16	7575	157	1.000	1.220	1.426	1.209	0.217	0.774	0.631	0.143
12		5x3x5/16	7576	157	1.000	1.220	1.283	1.197	0.086	0.681	0.625	0.057
END	EV1	18-I-64	41	170								
	EV2	18-I-64	40	161								
		18-I-64	125	43	1.000	1.694	0.561	0.058	0.502	0.365	0.033	0.331
	EV3	18-I-64	39	181	10.563	1.694	0.510	0.393	0.117	0.282	0.205	0.077
Total Overstressed Members							49			18		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.24. Hangars 43, 47, 44, and 45 Truss SF Type I Infill Struts, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V1	18-I-64	3	170						
1	VM	2 Z 4x3	7594	85						
1		2 Z 4x3	7595	85						
1	HT	5x5x3/8	7582	120						
1		5x5x3/8	7583	120						
1	HB	1 C 10-20	7580	120	0.643	0.527	0.116	0.393	0.316	0.077
1		L 3x2x1/4	7581	120	0.628	0.523	0.105	0.383	0.314	0.069
1	HM1	L 3x2x1/4	7592	60						
1	HM2	L 3x2x1/4	7593	60						
1	D1A	L 3x21/2x1/4	7586	104						
1		L 3x21/2x1/4	7587	104						
1	D2A	L 3x21/2x1/4	7584	104						
1		L 3x21/2x1/4	7585	104						
1	D1B	L 3x21/2x1/4	7590	104						
1		L 3x21/2x1/4	7591	104						
1	D2B	L 3x21/2x1/4	7588	104						
1		L 3x21/2x1/4	7589	104						
1	V2	18-I-64	2	161						
		18-I-64	113	43						
1	V3	18-I-64	1	181						
1	H	12-I-40	7821	240						
1	H2	10-I-21	101	240	0.545	0.000	0.545	0.360	0.000	0.360
1	D1C	5x3x5/16	7561	157	fa>Fe			0.889		
1		5x3x5/16	7562	157	fa>Fe			0.868		
1	D2C	6x3.5x3/8	7559	157						
1		6x3.5x3/8	7560	157						
1	D1D	5x3x5/16	7557	157	0.591	0.509	0.082	0.360	0.305	0.054
1		5x3x5/16	7558	157	0.559	0.504	0.055	0.339	0.302	0.036
1	D2D	6x3.5x3/8	7555	157						
1		6x3.5x3/8	7556	157						
2	V1	18-I-85	6	170						
2	VM	2 Z 4x3	7614	85						
2		2 Z 4x3	7615	85						
2	HT	5x5x3/8	7602	120						
2		5x5x3/8	7603	120						
2	HB	1 C 10-15.3	7600	120						
2		L 3x2x1/4	7601	120						
2	HM1	L 3x2x1/4	7612	60						
2	HM2	L 3x2x1/4	7613	60						
2	D1A	L 3x21/2x1/4	7606	104						
2		L 3x21/2x1/4	7607	104						
2	D2A	L 3x21/2x1/4	7604	104						
2		L 3x21/2x1/4	7605	104						
2	D1B	L 3x21/2x1/4	7610	104						
2		L 3x21/2x1/4	7611	104						
2	D2B	L 3x21/2x1/4	7608	104						
2		L 3x21/2x1/4	7609	104						
2	V2	18-I-85	5	161						
		18-I-85	114	43						
2	V3	18-I-85	4	181						
2	H2	10-I-21	102	240						
2	H	C 8-11.5	7822	240						
		12 - I - 25								

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
3	V1	18-I-85	9	170						
3	VM	2 Z 4x3	7634	85						
3		2 Z 4x3	7635	85						
3	HT	5x5x3/8	7622	120						
3		5x5x3/8	7623	120						
3	HB	1 C 10-15.3	7620	120						
3		L 3x2x1/4	7621	120						
3	HM1	L 3x2x1/4	7632	60						
3	HM2	L 3x2x1/4	7633	60						
3	D1A	L 3x21/2x1/4	7626	104						
3		L 3x21/2x1/4	7627	104						
3	D2A	L 3x21/2x1/4	7624	104						
3		L 3x21/2x1/4	7625	104						
3	D1B	L 3x21/2x1/4	7630	104						
3		L 3x21/2x1/4	7631	104						
3	D2B	L 3x21/2x1/4	7628	104						
3		L 3x21/2x1/4	7629	104						
3	V2	18-I-85	8	161						
3		18-I-85	115	43						
3	V3	18-I-85	7	181						
3	H2	10-I-21	103	240						
3	H	14-I-30	7823	240						
4	V1	18-I-85	12	170						
4	VM	2 Z 4x3	7654	85						
4		2 Z 4x3	7655	85						
4	HT	5x5x3/8	7642	120						
4		5x5x3/8	7643	120						
4	HB	1 C 10-15.3	7640	120						
4		L 3x2x1/4	7641	120						
4	HM1	L 3x2x1/4	7652	60						
4	HM2	L 3x2x1/4	7653	60						
4	D1A	L 3x21/2x1/4	7646	104						
4		L 3x21/2x1/4	7647	104						
4	D2A	L 3x21/2x1/4	7644	104						
4		L 3x21/2x1/4	7645	104						
4	D1B	L 3x21/2x1/4	7650	104						
4		L 3x21/2x1/4	7651	104						
4	D2B	L 3x21/2x1/4	7648	104						
4		L 3x21/2x1/4	7649	104						
4	V2	18-I-85	11	161						
4		18-I-85	116	43						
4	V3	18-I-85	10	181						
4	H2	10-I-21	104	240						
4	H	C 8-11.5	7824	240						
		12 - I - 25								

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
5	V1	18-I-85	15	170						
5	VM	2 Z 4x3	7674	85						
5		2 Z 4x3	7675	85						
5	HT	5x5x3/8	7662	120						
5		5x5x3/8	7663	120						
5	HB	1 C 10-15.3	7660	120						
5		L 3x2x1/4	7661	120						
5	HM1	L 3x2x1/4	7672	60						
5	HM2	L 3x2x1/4	7673	60						
5	D1A	L 3x21/2x1/4	7666	104						
5		L 3x21/2x1/4	7667	104						
5	D2A	L 3x21/2x1/4	7664	104						
5		L 3x21/2x1/4	7665	104						
5	D1B	L 3x21/2x1/4	7670	104						
5		L 3x21/2x1/4	7671	104						
5	D2B	L 3x21/2x1/4	7668	104						
5		L 3x21/2x1/4	7669	104						
5	V2	18-I-85	14	161						
5		18-I-85	117	43						
5	V3	18-I-85	13	181						
5		10-I-21	105	240						
5	H	C 8-11.5	7825	240						
		12 - I - 25								
6	V1	18-I-85	18	170						
6	VM	2 Z 4x3	7694	85						
6		2 Z 4x3	7695	85						
6	HT	5x5x3/8	7682	120						
6		5x5x3/8	7683	120						
6	HB	1 C 10-15.3	7680	120						
6		L 3x2x1/4	7681	120						
6	HM1	L 3x2x1/4	7692	60						
6	HM2	L 3x2x1/4	7693	60						
6	D1A	L 3x21/2x1/4	7686	104						
6		L 3x21/2x1/4	7687	104						
6	D2A	L 3x21/2x1/4	7684	104						
6		L 3x21/2x1/4	7685	104						
6	D1B	L 3x21/2x1/4	7690	104						
6		L 3x21/2x1/4	7691	104						
6	D2B	L 3x21/2x1/4	7688	104						
6		L 3x21/2x1/4	7689	104						
6	V2	18-I-85	17	161						
6		18-I-85	118	43						
6	V3	18-I-85	16	181						
6	H2	10-I-21	106	240						
6	H	12-I-40	7826	240						
6	D1C	L 5x3x5/16	7569	157	0.683	0.621	0.062	0.414	0.373	0.041
6		L 5x3x5/16	7570	157	0.676	0.615	0.061	0.409	0.369	0.040
6	D2C	L 5x3x5/16	7567	157	0.670	0.608	0.062	0.406	0.365	0.041
6		L 5x3x5/16	7568	157	0.678	0.613	0.065	0.411	0.368	0.043
6	D1D	L 5x3x5/16	7565	157						
6		L 5x3x5/16	7566	157						
6	D2D	L 5x3x5/16	7563	157						
6		L 5x3x5/16	7564	157						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
7	V1	18-I-85	21	170						
7	VM	2 Z 4x3	7714	85						
7		2 Z 4x3	7715	85						
7	HT	5x5x3/8	7702	120						
7		5x5x3/8	7703	120						
7	HB	1 C 10-15.3	7700	120	0.565	0.418	0.148	0.348	0.251	0.098
7		L 3x2x1/4	7701	120	0.506	0.392	0.114	0.310	0.235	0.075
7	HM1	L 3x2x1/4	7712	60						
7	HM2	L 3x2x1/4	7713	60						
7	D1A	L 3x21/2x1/4	7706	104						
7		L 3x21/2x1/4	7707	104						
7	D2A	L 3x21/2x1/4	7704	104						
7		L 3x21/2x1/4	7705	104						
7	D1B	L 3x21/2x1/4	7710	104						
7		L 3x21/2x1/4	7711	104						
7	D2B	L 3x21/2x1/4	7708	104						
7		L 3x21/2x1/4	7709	104						
7	V2	18-I-85	20	161						
7		18-I-85	119	43						
7	V3	18-I-85	19	181						
7	H2	10+-I-21	107	240						
7	H	C 8-11.5	7827	240						
		12 - I - 25								
8	V1	18-I-85	24	170						
8	VM	2 Z 4x3	7734	85						
8		2 Z 4x3	7735	85						
8	HT	5x5x3/8	7722	120						
8		5x5x3/8	7723	120						
8	HB	1 C 10-15.3	7720	120	0.521	0.380	0.141	0.321	0.228	0.093
8		L 3x2x1/4	7721	120						
8	HM1	L 3x2x1/4	7732	60						
8	HM2	L 3x2x1/4	7733	60						
8	D1A	L 3x21/2x1/4	7726	104						
8		L 3x21/2x1/4	7727	104						
8	D2A	L 3x21/2x1/4	7724	104						
8		L 3x21/2x1/4	7725	104						
8	D1B	L 3x21/2x1/4	7730	104						
8		L 3x21/2x1/4	7731	104						
8	D2B	L 3x21/2x1/4	7728	104						
8		L 3x21/2x1/4	7729	104						
8	V2	18-I-85	23	161						
8		18-I-85	120	43						
8	V3	18-I-85	22	181						
8	H2	10I-21	108	240						
8	H	C 8-11.5	7828	240						
		12 - I - 25								

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
9	V1	18-I-85	27	170						
9	VM	2 Z 4x3	7754	85						
9		2 Z 4x3	7755	85						
9	HT	5x5x3/8	7742	120						
9		5x5x3/8	7743	120						
9	HB	1 C 10-15.3	7740	120	0.517	0.376	0.141	0.319	0.226	0.093
9		L 3x2x1/4	7741	120						
9	HM1	L 3x2x1/4	7752	60						
9	HM2	L 3x2x1/4	7753	60						
9	D1A	L 3x21/2x1/4	7746	104						
9		L 3x21/2x1/4	7747	104						
9	D2A	L 3x21/2x1/4	7744	104						
9		L 3x21/2x1/4	7745	104						
9	D1B	L 3x21/2x1/4	7750	104						
9		L 3x21/2x1/4	7751	104						
9	D2B	L 3x21/2x1/4	7748	104						
9		L 3x21/2x1/4	7749	104						
9	V2	18-I-85	26	161						
9		18-I-85	121	43						
9	V3	18-I-85	25	181						
9	H2	10-I-21	109	240						
9	H	C 8-11.5	7829	240						
		12 - I - 25								
10	V1	18-I-85	30	170						
10	VM	2 Z 4x3	7774	85						
10		2 Z 4x3	7775	85						
10	HT	5x5x3/8	7762	120						
10		5x5x3/8	7763	120						
10	HB	1 C 10-15.3	7760	120	0.532	0.384	0.148	0.328	0.230	0.098
10		L 3x2x1/4	7761	120						
10	HM1	L 3x2x1/4	7772	60						
10	HM2	L 3x2x1/4	7773	60						
10	D1A	L 3x21/2x1/4	7766	104						
10		L 3x21/2x1/4	7767	104						
10	D2A	L 3x21/2x1/4	7764	104						
10		L 3x21/2x1/4	7765	104						
10	D1B	L 3x21/2x1/4	7770	104						
10		L 3x21/2x1/4	7771	104						
10	D2B	L 3x21/2x1/4	7768	104						
10		L 3x21/2x1/4	7769	104						
10	V2	18-I-85	29	161						
10		18-I-85	122	43						
10	V3	18-I-85	28	181						
10	H2	10-I-21	110	240						
10	H	14-I-30	7830	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
11	V1	18-I-85	34	170						
11	VM	2 Z 4x3	7794	85						
11		2 Z 4x3	7795	85						
11	HT	5x5x3/8	7782	120						
11		5x5x3/8	7783	120						
11	HB	1 C 10-15.3	7780	120	0.547	0.383	0.164	0.338	0.230	0.108
11		L 3x2x1/4	7781	120						
11	HM1	L 3x2x1/4	7792	60						
11	HM2	L 3x2x1/4	7793	60						
11	D1A	L 3x21/2x1/4	7786	104						
11		L 3x21/2x1/4	7787	104						
11	D2A	L 3x21/2x1/4	7784	104						
11		L 3x21/2x1/4	7785	104						
11	D1B	L 3x21/2x1/4	7790	104						
11		L 3x21/2x1/4	7791	104						
11	D2B	L 3x21/2x1/4	7788	104						
11		L 3x21/2x1/4	7789	104						
11	V2	18-I-85	33	161						
11		18-I-85	123	43						
11	V3	18-I-85	32	97	0.520	0.126	0.395	0.336	0.076	0.261
11		18-I-85	31	84	0.527	0.132	0.395	0.340	0.079	0.261
11	H2	10-I-21	111	240	0.533	0.000	0.533	0.352	0.000	0.352
11	H	12-I-40	7831	240						
11	D1D	6x31/2x5/16	7573	140						
11		6x31/2x5/16	7574	140						
11	D2D	5x3x5/16	7571	140						
11		5x3x5/16	7572	140						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length		AXL	B22		AXL	B22
12	V1	18-I-85	38	170						
12	VM	2 Z 4x3	7814	85						
12		2 Z 4x3	7815	85						
12	HT	5x5x3/8	7802	120						
12		5x5x3/8	7803	120						
12	HB	1 C 10-20	7800	120	0.593	0.493	0.100	0.362	0.296	0.066
12		L 3x2x1/4	7801	120	0.670	0.524	0.146	0.411	0.314	0.096
12	HM1	L 3x2x1/4	7812	60						
12	HM2	L 3x2x1/4	7813	60						
12	D1A	L 3x21/2x1/4	7806	104						
12		L 3x21/2x1/4	7807	104						
12	D2A	L 3x21/2x1/4	7804	104						
12		L 3x21/2x1/4	7805	104						
12	D1B	L 3x21/2x1/4	7810	104						
12		L 3x21/2x1/4	7811	104						
12	D2B	L 3x21/2x1/4	7808	104						
12		L 3x21/2x1/4	7809	104						
12	V2	18-I-85	37	161						
12		18-I-85	124	43	0.525	0.169	0.356	0.336	0.101	0.235
12	V3	18-I-85	36	97						
12		18-I-85	35	84						
12	H2	10-I-21	112	240	0.549	0.000	0.549	0.362	0.000	0.362
12	H	12-I-40	7832	240						
12	D1C	6x31/2x3/8	7577	157						
12		6x31/2x3/8	7578	157						
12	D2C	5x3x5/16	7575	157	0.855	0.825	0.030	0.515	0.495	0.020
12		5x3x5/16	7576	157	0.886	0.829	0.057	0.535	0.497	0.038
END	EV1	18-I-64	41	170						
	EV2	18-I-64	40	161						
		18-I-64	125	43						
	EV3	18-I-64	39	181						
		Total Overstressed Members			2			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.25. Hangars 43, 47, 44, and 45 Truss SF Type I Infill Struts, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
1	V1	18-I-64	3	170								
1	VM	2 Z 4x3	7594	85								
1		2 Z 4x3	7595	85								
1	HT	5x5x3/8	7582	120								
1		5x5x3/8	7583	120								
1	HB	1 C 10-20	7580	120	1.000	0.927	1.251	0.752	0.499	0.722	0.392	0.329
1		L 3x2x1/4	7581	120	1.000	0.927	1.260	0.765	0.495	0.726	0.399	0.327
1	HM1	L 3x2x1/4	7592	60								
1	HM2	L 3x2x1/4	7593	60								
1	D1A	L 3x21/2x1/4	7586	104								
1		L 3x21/2x1/4	7587	104								
1	D2A	L 3x21/2x1/4	7584	104								
1		L 3x21/2x1/4	7585	104								
1	D1B	L 3x21/2x1/4	7590	104								
1		L 3x21/2x1/4	7591	104								
1	D2B	L 3x21/2x1/4	7588	104								
1		L 3x21/2x1/4	7589	104								
1	V2	18-I-64	2	161								
		18-I-64	113	43	1.000	1.694	0.523	0.073	0.451	0.340	0.042	0.298
1	V3	18-I-64	1	181	1.000	1.694	0.673	0.592	0.082	0.364	0.310	0.054
1	H	12-I-40	7821	240								
1	H2	10-I-21	101	240								
1	D1C	5x3x5/16	7561	157			fa>Fe					
1		5x3x5/16	7562	157			fa>Fe					
1	D2C	6x3.5x3/8	7559	157	1.000	1.389	0.772	0.734	0.039	0.409	0.384	0.026
1		6x3.5x3/8	7560	157	1.000	1.389	0.790	0.728	0.062	0.421	0.381	0.041
1	D1D	5x3x5/16	7557	157	1.000	1.220	1.070	0.981	0.089	0.571	0.512	0.059
1		5x3x5/16	7558	157	1.000	1.220	1.057	0.991	0.066	0.561	0.517	0.044
1	D2D	6x3.5x3/8	7555	157	1.000	1.389	0.542	0.496	0.046	0.290	0.259	0.030
1		6x3.5x3/8	7556	157	1.000	1.389	0.556	0.490	0.067	0.300	0.256	0.044
2	V1	18-I-85	6	170								
2	VM	2 Z 4x3	7614	85								
2		2 Z 4x3	7615	85								
2	HT	5x5x3/8	7602	120								
2		5x5x3/8	7603	120								
2	HB	1 C 10-15.3	7600	120	1.000	1.016	0.735	0.556	0.179	0.408	0.290	0.118
2		L 3x2x1/4	7601	120	1.000	1.016	0.708	0.437	0.272	0.408	0.228	0.180
2	HM1	L 3x2x1/4	7612	60								
2	HM2	L 3x2x1/4	7613	60								
2	D1A	L 3x21/2x1/4	7606	104	1.000	0.753	0.741	0.709	0.032	0.391	0.370	0.021
2		L 3x21/2x1/4	7607	104	1.000	0.753	0.692	0.659	0.033	0.366	0.344	0.022
2	D2A	L 3x21/2x1/4	7604	104	1.000	0.753	0.817	0.760	0.056	0.433	0.397	0.037
2		L 3x21/2x1/4	7605	104	1.000	0.753	0.666	0.625	0.040	0.352	0.326	0.026
2	D1B	L 3x21/2x1/4	7610	104	1.000	0.753	0.800	0.761	0.038	0.422	0.397	0.025
2		L 3x21/2x1/4	7611	104	1.000	0.753	0.878	0.824	0.054	0.466	0.430	0.036
2	D2B	L 3x21/2x1/4	7608	104	1.000	0.753	0.594	0.553	0.041	0.316	0.289	0.027
2		L 3x21/2x1/4	7609	104	1.000	0.753	0.715	0.677	0.038	0.378	0.353	0.025
2	V2	18-I-85	5	161								
		18-I-85	114	43								
2	V3	18-I-85	4	181								
2	H2	10-I-21	102	240	1.000	1.325	0.639	0.189	0.450	0.396	0.099	0.297
2	H	C 8-11.5	7822	240								
		12 - I - 25										

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
3	V1	18-I-85	9	170								
3	VM	2 Z 4x3	7634	85								
3		2 Z 4x3	7635	85								
3	HT	5x5x3/8	7622	120								
3		5x5x3/8	7623	120								
3	HB	1 C 10-15.3	7620	120								
3		L 3x2x1/4	7621	120								
3	HM1	L 3x2x1/4	7632	60								
3	HM2	L 3x2x1/4	7633	60								
3	D1A	L 3x21/2x1/4	7626	104								
3		L 3x21/2x1/4	7627	104								
3	D2A	L 3x21/2x1/4	7624	104	1.000	0.753	0.621	0.579	0.042	0.330	0.302	0.028
3		L 3x21/2x1/4	7625	104								
3	D1B	L 3x21/2x1/4	7630	104								
3		L 3x21/2x1/4	7631	104	1.000	0.753	0.583	0.541	0.041	0.309	0.282	0.027
3	D2B	L 3x21/2x1/4	7628	104								
3		L 3x21/2x1/4	7629	104	1.000	0.753	0.536	0.508	0.028	0.284	0.265	0.018
3	V2	18-I-85	8	161								
3		18-I-85	115	43								
3	V3	18-I-85	7	181								
3	H2	10-I-21	103	240	1.000	1.325	0.654	0.254	0.400	0.397	0.133	0.264
3	H	14-I-30	7823	240								
4	V1	18-I-85	12	170								
4	VM	2 Z 4x3	7654	85								
4		2 Z 4x3	7655	85								
4	HT	5x5x3/8	7642	120								
4		5x5x3/8	7643	120								
4	HB	1 C 10-15.3	7640	120	1.000	1.016	0.543	0.342	0.201	0.311	0.179	0.133
4		L 3x2x1/4	7641	120	1.000	1.016	0.565	0.421	0.144	0.315	0.220	0.095
4	HM1	L 3x2x1/4	7652	60								
4	HM2	L 3x2x1/4	7653	60								
4	D1A	L 3x21/2x1/4	7646	104	1.000	0.753	0.576	0.551	0.025	0.304	0.287	0.017
4		L 3x21/2x1/4	7647	104								
4	D2A	L 3x21/2x1/4	7644	104								
4		L 3x21/2x1/4	7645	104								
4	D1B	L 3x21/2x1/4	7650	104								
4		L 3x21/2x1/4	7651	104	1.000	0.753	0.683	0.637	0.047	0.363	0.332	0.031
4	D2B	L 3x21/2x1/4	7648	104								
4		L 3x21/2x1/4	7649	104								
4	V2	18-I-85	11	161								
4		18-I-85	116	43								
4	V3	18-I-85	10	181								
4	H2	10-I-21	104	240	1.000	1.325	0.653	0.289	0.363	0.390	0.151	0.240
4	H	C 8-11.5	7824	240								
		12 - I - 25										

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
5	V1	18-I-85	15	170								
5	VM	2 Z 4x3	7674	85								
5		2 Z 4x3	7675	85								
5	HT	5x5x3/8	7662	120								
5		5x5x3/8	7663	120								
5	HB	1 C 10-15.3	7660	120	1.000	1.016	0.744	0.477	0.267	0.425	0.249	0.176
5		L 3x2x1/4	7661	120	1.000	1.016	0.760	0.568	0.192	0.423	0.297	0.127
5	HM1	L 3x2x1/4	7672	60								
5	HM2	L 3x2x1/4	7673	60								
5	D1A	L 3x21/2x1/4	7666	104	1.000	0.753	0.642	0.613	0.029	0.339	0.320	0.019
5		L 3x21/2x1/4	7667	104								
5	D2A	L 3x21/2x1/4	7664	104	1.000	0.753	0.557	0.523	0.033	0.295	0.273	0.022
5		L 3x21/2x1/4	7665	104								
5	D1B	L 3x21/2x1/4	7670	104	1.000	0.753	0.561	0.529	0.032	0.297	0.276	0.021
5		L 3x21/2x1/4	7671	104	1.000	0.753	0.761	0.709	0.052	0.404	0.370	0.034
5	D2B	L 3x21/2x1/4	7668	104								
5		L 3x21/2x1/4	7669	104								
5	V2	18-I-85	14	161								
5		18-I-85	117	43								
5	V3	18-I-85	13	181								
5		10-I-21	105	240	1.000	1.325	0.587	0.287	0.300	0.348	0.150	0.198
5	H	C 8-11.5	7825	240								
		12 - I - 25										
6	V1	18-I-85	18	170								
6	VM	2 Z 4x3	7694	85								
6		2 Z 4x3	7695	85								
6	HT	5x5x3/8	7682	120								
6		5x5x3/8	7683	120								
6	HB	1 C 10-15.3	7680	120								
6		L 3x2x1/4	7681	120								
6	HM1	L 3x2x1/4	7692	60								
6	HM2	L 3x2x1/4	7693	60								
6	D1A	L 3x21/2x1/4	7686	104								
6		L 3x21/2x1/4	7687	104								
6	D2A	L 3x21/2x1/4	7684	104								
6		L 3x21/2x1/4	7685	104								
6	D1B	L 3x21/2x1/4	7690	104								
6		L 3x21/2x1/4	7691	104								
6	D2B	L 3x21/2x1/4	7688	104								
6		L 3x21/2x1/4	7689	104								
6	V2	18-I-85	17	161								
6		18-I-85	118	43								
6	V3	18-I-85	16	181								
6	H2	10-I-21	106	240	1.000	1.325	0.554	0.369	0.185	0.315	0.193	0.122
6	H	12-I-40	7826	240								
6	D1C	L 5x3x5/16	7569	157	1.000	0.854	5.373	3.463	1.910	3.067	1.807	1.261
6		L 5x3x5/16	7570	157	1.000	0.854	5.957	3.492	2.465	3.449	1.822	1.627
6	D2C	L 5x3x5/16	7567	157	1.000	0.854	7.129	3.520	3.608	4.218	1.837	2.381
6		L 5x3x5/16	7568	157	1.000	0.854	5.935	3.492	2.443	3.434	1.822	1.612
6	D1D	L 5x3x5/16	7565	157	1.000	0.854	0.843	0.768	0.075	0.450	0.401	0.050
6		L 5x3x5/16	7566	157	1.000	0.854	0.863	0.796	0.068	0.460	0.415	0.045
6	D2D	L 5x3x5/16	7563	157	1.000	0.854	0.805	0.737	0.068	0.429	0.385	0.045
6		L 5x3x5/16	7564	157	1.000	0.854	0.784	0.709	0.075	0.419	0.370	0.050

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
7	V1	18-I-85	21	170								
7	VM	2 Z 4x3	7714	85								
7		2 Z 4x3	7715	85								
7	HT	5x5x3/8	7702	120								
7		5x5x3/8	7703	120								
7	HB	1 C 10-15.3	7700	120	1.000	1.016	0.943	0.676	0.267	0.529	0.353	0.176
7		L 3x2x1/4	7701	120	1.000	1.016	0.930	0.591	0.339	0.532	0.309	0.224
7	HM1	L 3x2x1/4	7712	60								
7	HM2	L 3x2x1/4	7713	60								
7	D1A	L 3x21/2x1/4	7706	104								
7		L 3x21/2x1/4	7707	104								
7	D2A	L 3x21/2x1/4	7704	104	1.000	0.753	0.742	0.687	0.055	0.395	0.358	0.036
7		L 3x21/2x1/4	7705	104	1.000	0.753	0.525	0.493	0.032	0.278	0.257	0.021
7	D1B	L 3x21/2x1/4	7710	104								
7		L 3x21/2x1/4	7711	104	1.000	0.753	0.508	0.479	0.029	0.269	0.250	0.019
7	D2B	L 3x21/2x1/4	7708	104								
7		L 3x21/2x1/4	7709	104	1.000	0.753	0.634	0.605	0.029	0.335	0.316	0.019
7	V2	18-I-85	20	161								
7		18-I-85	119	43								
7	V3	18-I-85	19	181								
7	H2	10+-I-21	107	240	1.000	1.325	0.751	0.445	0.307	0.435	0.232	0.203
7	H	C 8-11.5	7827	240								
		12 - I - 25										
8	V1	18-I-85	24	170								
8	VM	2 Z 4x3	7734	85								
8		2 Z 4x3	7735	85								
8	HT	5x5x3/8	7722	120								
8		5x5x3/8	7723	120								
8	HB	1 C 10-15.3	7720	120	1.000	1.016	0.753	0.549	0.205	0.422	0.287	0.135
8		L 3x2x1/4	7721	120	1.000	1.016	0.743	0.494	0.249	0.422	0.258	0.164
8	HM1	L 3x2x1/4	7732	60								
8	HM2	L 3x2x1/4	7733	60								
8	D1A	L 3x21/2x1/4	7726	104								
8		L 3x21/2x1/4	7727	104								
8	D2A	L 3x21/2x1/4	7724	104	1.000	0.753	0.598	0.552	0.249	0.452	0.288	0.164
8		L 3x21/2x1/4	7725	104								
8	D1B	L 3x21/2x1/4	7730	104								
8		L 3x21/2x1/4	7731	104								
8	D2B	L 3x21/2x1/4	7728	104								
8		L 3x21/2x1/4	7729	104								
8	V2	18-I-85	23	161								
8		18-I-85	120	43								
8	V3	18-I-85	22	181								
8	H2	10I-21	108	240	1.000	1.325	0.841	0.460	0.381	0.491	0.240	0.251
8	H	C 8-11.5	7828	240								
		12 - I - 25										

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V1	18-I-85	27	170								
9	VM	2 Z 4x3	7754	85								
9		2 Z 4x3	7755	85								
9	HT	5x5x3/8	7742	120								
9		5x5x3/8	7743	120								
9	HB	1 C 10-15.3	7740	120	1.000	1.016	0.645	0.480	0.165	0.360	0.251	0.109
9		L 3x2x1/4	7741	120	1.000	1.016	0.630	0.412	0.217	0.358	0.215	0.143
9	HM1	L 3x2x1/4	7752	60								
9	HM2	L 3x2x1/4	7753	60								
9	D1A	L 3x21/2x1/4	7746	104								
9		L 3x21/2x1/4	7747	104								
9	D2A	L 3x21/2x1/4	7744	104	1.000	0.753	0.666	0.620	0.047	0.354	0.323	0.031
9		L 3x21/2x1/4	7745	104								
9	D1B	L 3x21/2x1/4	7750	104								
9		L 3x21/2x1/4	7751	104								
9	D2B	L 3x21/2x1/4	7748	104								
9		L 3x21/2x1/4	7749	104	1.000	0.753	0.557	0.532	0.026	0.295	0.278	0.017
9	V2	18-I-85	26	161								
9		18-I-85	121	43								
9	V3	18-I-85	25	181								
9	H2	10-I-21	109	240	1.000	1.325	0.868	0.439	0.430	0.513	0.229	0.284
9	H	C 8-11.5	7829	240								
		12 - I - 25										
10	V1	18-I-85	30	170								
10	VM	2 Z 4x3	7774	85								
10		2 Z 4x3	7775	85								
10	HT	5x5x3/8	7762	120								
10		5x5x3/8	7763	120								
10	HB	1 C 10-15.3	7760	120	1.000	1.016	0.574	0.415	0.159	0.322	0.217	0.105
10		L 3x2x1/4	7761	120	1.000	1.016	0.551	0.339	0.212	0.317	0.177	0.140
10	HM1	L 3x2x1/4	7772	60								
10	HM2	L 3x2x1/4	7773	60								
10	D1A	L 3x21/2x1/4	7766	104								
10		L 3x21/2x1/4	7767	104								
10	D2A	L 3x21/2x1/4	7764	104	1.000	0.753	0.574	0.531	0.043	0.305	0.277	0.028
10		L 3x21/2x1/4	7765	104								
10	D1B	L 3x21/2x1/4	7770	104								
10		L 3x21/2x1/4	7771	104	1.000	0.753	0.555	0.519	0.037	0.295	0.271	0.024
10	D2B	L 3x21/2x1/4	7768	104								
10		L 3x21/2x1/4	7769	104								
10	V2	18-I-85	29	161								
10		18-I-85	122	43								
10	V3	18-I-85	28	181								
10	H2	10-I-21	110	240	1.000	1.325	0.855	0.387	0.468	0.511	0.202	0.309
10	H	14-I-30	7830	240								

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x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
11	V1	18-I-85	34	170								
11	VM	2 Z 4x3	7794	85								
11		2 Z 4x3	7795	85								
11	HT	5x5x3/8	7782	120								
11		5x5x3/8	7783	120								
11	HB	1 C 10-15.3	7780	120	1.000	1.016	0.526	0.317	0.209	0.303	0.166	0.138
11		L 3x2x1/4	7781	120	1.000	1.016	0.555	0.411	0.144	0.310	0.215	0.095
11	HM1	L 3x2x1/4	7792	60								
11	HM2	L 3x2x1/4	7793	60								
11	D1A	L 3x21/2x1/4	7786	104	1.000	0.753	0.577	0.542	0.035	0.306	0.283	0.023
11		L 3x21/2x1/4	7787	104								
11	D2A	L 3x21/2x1/4	7784	104	1.000	0.753	0.760	0.709	0.051	0.404	0.370	0.034
11		L 3x21/2x1/4	7785	104	1.000	0.753	0.656	0.623	0.033	0.347	0.325	0.022
11	D1B	L 3x21/2x1/4	7790	104	1.000	0.753	0.538	0.503	0.035	0.286	0.262	0.023
11		L 3x21/2x1/4	7791	104	1.000	0.753	0.667	0.623	0.044	0.354	0.325	0.029
11	D2B	L 3x21/2x1/4	7788	104	1.000	0.753	0.555	0.523	0.031	0.293	0.273	0.020
11		L 3x21/2x1/4	7789	104	1.000	0.753	0.626	0.598	0.028	0.330	0.312	0.018
11	V2	18-I-85	33	161								
11		18-I-85	123	43								
11	V3	18-I-85	32	97								
11		18-I-85	31	84								
11	H2	10-I-21	111	240	1.000	1.325	0.843	0.346	0.497	0.509	0.181	0.328
11	H	12-I-40	7831	240								
11	D1D	6x31/2x5/16	7573	140								
11		6x31/2x5/16	7574	140								
11	D2D	5x3x5/16	7571	140								
11		5x3x5/16	7572	140								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
12	V1	18-I-85	38	170								
12	VM	2 Z 4x3	7814	85								
12		2 Z 4x3	7815	85								
12	HT	5x5x3/8	7802	120								
12		5x5x3/8	7803	120								
12	HB	1 C 10-20	7800	120	1.000	0.927	1.249	0.765	0.484	0.719	0.399	0.319
12		L 3x2x1/4	7801	120	1.000	0.927	1.237	0.744	0.493	0.714	0.388	0.325
12	HM1	L 3x2x1/4	7812	60								
12	HM2	L 3x2x1/4	7813	60								
12	D1A	L 3x21/2x1/4	7806	104								
12		L 3x21/2x1/4	7807	104								
12	D2A	L 3x21/2x1/4	7804	104								
12		L 3x21/2x1/4	7805	104								
12	D1B	L 3x21/2x1/4	7810	104								
12		L 3x21/2x1/4	7811	104								
12	D2B	L 3x21/2x1/4	7808	104								
12		L 3x21/2x1/4	7809	104								
12	V2	18-I-85	37	161								
12		18-I-85	124	43								
12	V3	18-I-85	36	97								
12		18-I-85	35	84								
12	H2	10-I-21	112	240	1.000	1.325	0.503	0.151	0.353	0.312	0.079	0.233
12	H	12-I-40	7832	240								
12	D1C	6x31/2x3/8	7577	157								
12		6x31/2x3/8	7578	157								
12	D2C	5x3x5/16	7575	157	1.000	1.220	8.413	1.734	6.679	5.313	0.905	4.408
12		5x3x5/16	7576	157	1.000	1.220	3.460	1.722	1.738	2.046	0.898	1.147
END	EV1	18-I-64	41	170								
	EV2	18-I-64	40	161								
		18-I-64	125	43	1.000	1.694	0.561	0.058	0.502	0.365	0.033	0.331
	EV3	18-I-64	39	181	10.563	1.694	0.510	0.393	0.117	0.282	0.205	0.077
Total Overstressed Members							14			6		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.26. Hangars 44 and 45 Truss SF Type II, Tension.

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V1	18-I-64	90	170						
1	VM	2 Z 4x3	7594	85						
1		2 Z 4x3	7595	85						
1	HT	5x5x3/8	7582	120						
1		5x5x3/8	7583	120						
1	HB	1 C 10-20	7580	120	fa>Fe			0.527		
1		L 3x2x1/4	7581	120	fa>Fe			0.500		
1	HM1	L 3x2x1/4	7592	60						
1	HM2	L 3x2x1/4	7593	60						
1	D1A	L 3x21/2x1/4	7586	104						
1		L 3x21/2x1/4	7587	104						
1	D2A	L 3x21/2x1/4	7584	104						
1		L 3x21/2x1/4	7585	104						
1	D1B	L 3x21/2x1/4	7590	104						
1		L 3x21/2x1/4	7591	104						
1	D2B	L 3x21/2x1/4	7588	104						
1		L 3x21/2x1/4	7589	104						
1	V2	18-I-64	62	168						
1	V3	18-I-64	75	216						
1	H	14-I-30	37	240						
1	D1C	5x3x5/16	3	293	0.711	0.631	0.080	0.431	0.379	0.053
1		5x3x5/16	4	293	0.706	0.626	0.080	0.428	0.376	0.053
1	D2C	6x3.5x3/8	1	293						
1		6x3.5x3/8	2	293						
2	V1	18-I-85	91	170						
2	VM	2 Z 4x3	7614	85						
2		2 Z 4x3	7615	85						
2	HT	5x5x3/8	7602	120						
2		5x5x3/8	7603	120						
2	HB	1 C 10-15.3	7600	120	0.757	0.647	0.110	0.461	0.388	0.073
2		L 3x2x1/4	7601	120	0.748	0.643	0.105	0.455	0.386	0.069
2	HM1	L 3x2x1/4	7612	60						
2	HM2	L 3x2x1/4	7613	60						
2	D1A	L 3x21/2x1/4	7606	104						
2		L 3x21/2x1/4	7607	104						
2	D2A	L 3x21/2x1/4	7604	104						
2		L 3x21/2x1/4	7605	104						
2	D1B	L 3x21/2x1/4	7610	104						
2		L 3x21/2x1/4	7611	104						
2	D2B	L 3x21/2x1/4	7608	104						
2		L 3x21/2x1/4	7609	104						
2	V2	18-I-85	63	168						
2	V3	18-I-85	76	84	0.530	0.231	0.298	0.335	0.139	0.197
		18-I-85	77	132	0.608	0.013	0.595	0.401	0.008	0.393
2	H	14-I-30	38	240	0.628	0.513	0.115	0.384	0.308	0.076
2	D2D	6x3.5x3/8	5	274						
2		6x3.5x3/8	6	274						
2	D1D	5x3x5/16	7	274						
2		5x3x5/16	8	274	0.744	0.162	0.582	0.481	0.097	0.384

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
3	V1	18-I-85	92	170						
3	VM	2 Z 4x3	7634	85						
3		2 Z 4x3	7635	85						
3	HT	5x5x3/8	7622	120						
3		5x5x3/8	7623	120						
3	HB	1 C 10-15.3	7620	120	0.737	0.629	0.109	0.449	0.377	0.072
3		L 3x2x1/4	7621	120	0.738	0.629	0.109	0.449	0.377	0.072
3	HM1	L 3x2x1/4	7632	60						
3	HM2	L 3x2x1/4	7633	60						
3	D1A	L 3x21/2x1/4	7626	104						
3		L 3x21/2x1/4	7627	104						
3	D2A	L 3x21/2x1/4	7624	104						
3		L 3x21/2x1/4	7625	104						
3	D1B	L 3x21/2x1/4	7630	104						
3		L 3x21/2x1/4	7631	104						
3	D2B	L 3x21/2x1/4	7628	104						
3		L 3x21/2x1/4	7629	104						
3	V2	18-I-85	64	168						
3	V3	18-I-85	78	84						
3		18-I-85	79	132						
3	H	14-I-30	39	240	0.564	0.505	0.059	0.342	0.303	0.039
4	V1	18-I-85	93	170						
4	VM	2 Z 4x3	7654	85						
4		2 Z 4x3	7655	85						
4	HT	5x5x3/8	7642	120						
4		5x5x3/8	7643	120						
4	HB	1 C 10-15.3	7640	120	0.733	0.629	0.104	0.446	0.377	0.069
4		L 3x2x1/4	7641	120	0.749	0.637	0.112	0.456	0.382	0.074
4	HM1	L 3x2x1/4	7652	60						
4	HM2	L 3x2x1/4	7653	60						
4	D1A	L 3x21/2x1/4	7646	104						
4		L 3x21/2x1/4	7647	104						
4	D2A	L 3x21/2x1/4	7644	104						
4		L 3x21/2x1/4	7645	104						
4	D1B	L 3x21/2x1/4	7650	104						
4		L 3x21/2x1/4	7651	104						
4	D2B	L 3x21/2x1/4	7648	104						
4		L 3x21/2x1/4	7649	104						
4	V2	18-I-85	65	168						
4	V3	18-I-85	80	216						
4	H	14-I-30	40	240	0.644	0.504	0.140	0.395	0.302	0.092

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
5	V1	18-I-85	94	170						
5	VM	2 Z 4x3	7674	85						
5		2 Z 4x3	7675	85						
5	HT	5x5x3/8	7662	120						
5		5x5x3/8	7663	120						
5	HB	1 C 10-15.3	7660	120	0.739	0.652	0.087	0.533	0.391	0.057
5		L 3x2x1/4	7661	120	0.812	0.689	0.123	0.605	0.413	0.081
5	HM1	L 3x2x1/4	7672	60						
5	HM2	L 3x2x1/4	7673	60						
5	D1A	L 3x21/2x1/4	7666	104						
5		L 3x21/2x1/4	7667	104						
5	D2A	L 3x21/2x1/4	7664	104						
5		L 3x21/2x1/4	7665	104						
5	D1B	L 3x21/2x1/4	7670	104						
5		L 3x21/2x1/4	7671	104						
5	D2B	L 3x21/2x1/4	7668	104						
5		L 3x21/2x1/4	7669	104						
5	V2	18-I-85	66	168						
5	V3	18-I-85	81	216						
5	H	14-I-30	41	240	0.627	0.504	0.122	0.383	0.302	0.081
6	V1	18-I-85	95	170						
6	VM	2 Z 4x3	7694	85						
6		2 Z 4x3	7695	85						
6	HT	5x5x3/8	7682	120						
6		5x5x3/8	7683	120						
6	HB	1 C 10-15.3	7680	120	0.584	0.472	0.112	0.357	0.283	0.074
6		L 3x2x1/4	7681	120	0.580	0.470	0.110	0.355	0.282	0.073
6	HM1	L 3x2x1/4	7692	60						
6	HM2	L 3x2x1/4	7693	60						
6	D1A	L 3x21/2x1/4	7686	104						
6		L 3x21/2x1/4	7687	104						
6	D2A	L 3x21/2x1/4	7684	104						
6		L 3x21/2x1/4	7685	104						
6	D1B	L 3x21/2x1/4	7690	104						
6		L 3x21/2x1/4	7691	104						
6	D2B	L 3x21/2x1/4	7688	104						
6		L 3x21/2x1/4	7689	104						
6	V2	18-I-85	67	168						
6	V3	18-I-85	82	216						
6	H	14-I-30	42	240						
6	D1C	L 5x3x5/16	11	293	0.727	0.672	0.055	0.440	0.403	0.036
6		L 5x3x5/16	12	293	0.734	0.667	0.067	0.444	0.400	0.044
6	D2C	L 5x3x5/16	9	293	0.538	0.486	0.052	0.326	0.292	0.034
6		L 5x3x5/16	10	293	0.558	0.492	0.065	0.338	0.295	0.043
6	D1D	L 5x3x5/16	15	323	fa>Fe			0.676		
6		L 5x3x5/16	16	323	fa>Fe			0.691		
6	D2D	L 5x3x5/16	13	323	fa>Fe			0.512		
6		L 5x3x5/16	14	323	fa>Fe			0.506		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
7	V1	18-I-85	96	170						
7	VM	2 Z 4x3	7714	85						
7		2 Z 4x3	7715	85						
7	HT	5x5x3/8	7702	120						
7		5x5x3/8	7703	120						
7	HB	1 C 10-15.3	7700	120	0.522	0.377	0.145	0.322	0.226	0.096
7		L 3x2x1/4	7701	120	0.547	0.416	0.132	0.337	0.250	0.087
7	HM1	L 3x2x1/4	7712	60						
7	HM2	L 3x2x1/4	7713	60						
7	D1A	L 3x21/2x1/4	7706	104						
7		L 3x21/2x1/4	7707	104						
7	D2A	L 3x21/2x1/4	7704	104						
7		L 3x21/2x1/4	7705	104						
7	D1B	L 3x21/2x1/4	7710	104						
7		L 3x21/2x1/4	7711	104						
7	D2B	L 3x21/2x1/4	7708	104						
7		L 3x21/2x1/4	7709	104						
7	V2	18-I-85	68	168						
7	V3	18-I-85	83	216						
7	H	14-I-30	43	240						
8	V1	18-I-85	97	170						
8	VM	2 Z 4x3	7734	85						
8		2 Z 4x3	7735	85						
8	HT	5x5x3/8	7722	120						
8		5x5x3/8	7723	120						
8	HB	1 C 10-15.3	7720	120	0.551	0.414	0.137	0.339	0.248	0.090
8		L 3x2x1/4	7721	120						
8	HM1	L 3x2x1/4	7732	60						
8	HM2	L 3x2x1/4	7733	60						
8	D1A	L 3x21/2x1/4	7726	104						
8		L 3x21/2x1/4	7727	104						
8	D2A	L 3x21/2x1/4	7724	104						
8		L 3x21/2x1/4	7725	104						
8	D1B	L 3x21/2x1/4	7730	104						
8		L 3x21/2x1/4	7731	104						
8	D2B	L 3x21/2x1/4	7728	104						
8		L 3x21/2x1/4	7729	104						
8	V2	18-I-85	69	168						
8	V3	18-I-85	84	216						
8	H	14-I-30	44	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
9	V1	18-I-85	98	170						
9	VM	2 Z 4x3	7754	85						
9		2 Z 4x3	7755	85						
9	HT	5x5x3/8	7742	120						
9		5x5x3/8	7743	120						
9	HB	1 C 10-15.3	7740	120						
9		L 3x2x1/4	7741	120	0.536	0.390	0.146	0.330	0.234	0.096
9	HM1	L 3x2x1/4	7752	60						
9	HM2	L 3x2x1/4	7753	60						
9	D1A	L 3x21/2x1/4	7746	104						
9		L 3x21/2x1/4	7747	104						
9	D2A	L 3x21/2x1/4	7744	104						
9		L 3x21/2x1/4	7745	104						
9	D1B	L 3x21/2x1/4	7750	104						
9		L 3x21/2x1/4	7751	104						
9	D2B	L 3x21/2x1/4	7748	104						
9		L 3x21/2x1/4	7749	104						
9	V2	18-I-85	70	168						
9	V3	18-I-85	85	216						
9	H	14-I-30	45	240						
10	V1	18-I-85	99	170						
10	VM	2 Z 4x3	7774	85						
10		2 Z 4x3	7775	85						
10	HT	5x5x3/8	7762	120						
10		5x5x3/8	7763	120						
10	HB	1 C 10-15.3	7760	120	0.528	0.404	0.124	0.324	0.242	0.082
10		L 3x2x1/4	7761	120	0.576	0.428	0.148	0.354	0.257	0.098
10	HM1	L 3x2x1/4	7772	60						
10	HM2	L 3x2x1/4	7773	60						
10	D1A	L 3x21/2x1/4	7766	104						
10		L 3x21/2x1/4	7767	104						
10	D2A	L 3x21/2x1/4	7764	104						
10		L 3x21/2x1/4	7765	104						
10	D1B	L 3x21/2x1/4	7770	104						
10		L 3x21/2x1/4	7771	104						
10	D2B	L 3x21/2x1/4	7768	104						
10		L 3x21/2x1/4	7769	104						
10	V2	18-I-85	71	168						
10	V3	18-I-85	86	216						
10	H	14-I-30	46	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed			No FOS *		
					Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
11	V1	18-I-85	100	170						
11	VM	2 Z 4x3	7794	85						
11		2 Z 4x3	7795	85						
11	HT	5x5x3/8	7782	120						
11		5x5x3/8	7783	120						
11	HB	1 C 10-15.3	7780	120	0.566	0.467	0.099	0.346	0.280	0.065
11		L 3x2x1/4	7781	120	0.703	0.536	0.167	0.432	0.322	0.110
11	HM1	L 3x2x1/4	7792	60						
11	HM2	L 3x2x1/4	7793	60						
11	D1A	L 3x21/2x1/4	7786	104	0.520	0.498	0.022	0.313	0.299	0.015
11		L 3x21/2x1/4	7787	104						
11	D2A	L 3x21/2x1/4	7784	104						
11		L 3x21/2x1/4	7785	104						
11	D1B	L 3x21/2x1/4	7790	104						
11		L 3x21/2x1/4	7791	104	0.501	0.481	0.019	0.301	0.289	0.013
11	D2B	L 3x21/2x1/4	7788	104						
11		L 3x21/2x1/4	7789	104	0.508	0.475	0.033	0.307	0.285	0.022
11	V2	18-I-85	72	168						
11	V3	18-I-85	87	216						
11	H	14-I-30	47	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
12	V1	18-I-85	101	170						
12	VM	2 Z 4x3	7814	85						
12		2 Z 4x3	7815	85						
12	HT	5x5x3/8	7802	120						
12		5x5x3/8	7803	120						
12	HB	1 C 10-20	7800	120	0.577	0.478	0.099	0.352	0.287	0.065
12		L 3x2x1/4	7801	120	0.667	0.519	0.148	0.409	0.311	0.098
12	HM1	L 3x2x1/4	7812	60						
12	HM2	L 3x2x1/4	7813	60						
12	D1A	L 3x21/2x1/4	7806	104						
12		L 3x21/2x1/4	7807	104						
12	D2A	L 3x21/2x1/4	7804	104						
12		L 3x21/2x1/4	7805	104						
12	D1B	L 3x21/2x1/4	7810	104						
12		L 3x21/2x1/4	7811	104						
12	D2B	L 3x21/2x1/4	7808	104						
12		L 3x21/2x1/4	7809	104						
12	V2	18-I-85	73	168						
12	V3	18-I-85	88	216	0.526	0.449	0.077	0.320	0.269	0.051
12	H	14-I-30	48	240						
12	D1C	6x31/2x3/8	19	293	0.517	0.788	0.093	0.534	0.473	0.061
12		6x31/2x3/8	20	293						
12	D2C	5x3x5/16	17	293	0.885	0.844	0.041	0.533	0.506	0.027
12		5x3x5/16	18	293	0.906	0.850	0.056	0.547	0.510	0.037
12	D2D	5x3x5/16	21	323	fa>Fe			0.987		
12		5x3x5/16	22	323	fa>Fe			0.967		
12	D1D	6x31/2x3/8	23	323	0.774	0.698	0.076	0.469	0.419	0.050
12		6x31/2x3/8	24	323	0.768	0.696	0.072	0.465	0.418	0.048
END	EV1	18-I-64	102	170						
	EV2	18-I-64	74	168						
	EV3	18-I-64	89	216						
Total Overstressed Members					8			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 5.27. Hangars 44 and 45 Truss SF Type II, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
1	V1	18-I-64	90	170								
1	VM	2 Z 4x3	7594	85								
1		2 Z 4x3	7595	85								
1	HT	5x5x3/8	7582	120								
1		5x5x3/8	7583	120								
1	HB	1 C 10-20	7580	120			fa>Fe			0.606		
1		L 3x2x1/4	7581	120			fa>Fe			0.596		
1	HM1	L 3x2x1/4	7592	60								
1	HM2	L 3x2x1/4	7593	60								
1	D1A	L 3x21/2x1/4	7586	104								
1		L 3x21/2x1/4	7587	104								
1	D2A	L 3x21/2x1/4	7584	104	1.000	0.753	0.643	0.579	0.064	0.344	0.302	0.042
1		L 3x21/2x1/4	7585	104								
1	D1B	L 3x21/2x1/4	7590	104								
1		L 3x21/2x1/4	7591	104								
1	D2B	L 3x21/2x1/4	7588	104								
1		L 3x21/2x1/4	7589	104	1.000	0.753	0.501	0.475	0.027	0.266	0.248	0.018
1	V2	18-I-64	62	168								
1	V3	18-I-64	75	216								
1	H	14-I-30	37	240								
1	D1C	5x3x5/16	3	293	1.000	1.220	1.080	0.963	0.116	0.579	0.502	0.077
1		5x3x5/16	4	293	1.000	1.220	1.109	0.972	0.137	0.598	0.507	0.090
1	D2C	6x3.5x3/8	1	293								
1		6x3.5x3/8	2	293								
2	V1	18-I-85	91	170								
2	VM	2 Z 4x3	7614	85								
2		2 Z 4x3	7615	85								
2	HT	5x5x3/8	7602	120								
2		5x5x3/8	7603	120								
2	HB	1 C 10-15.3	7600	120	1.000	1.016	1.656	0.859	0.797	0.975	0.449	0.526
2		L 3x2x1/4	7601	120	1.000	1.016	1.660	0.861	0.798	0.976	0.450	0.527
2	HM1	L 3x2x1/4	7612	60								
2	HM2	L 3x2x1/4	7613	60								
2	D1A	L 3x21/2x1/4	7606	104								
2		L 3x21/2x1/4	7607	104								
2	D2A	L 3x21/2x1/4	7604	104								
2		L 3x21/2x1/4	7605	104								
2	D1B	L 3x21/2x1/4	7610	104								
2		L 3x21/2x1/4	7611	104								
2	D2B	L 3x21/2x1/4	7608	104								
2		L 3x21/2x1/4	7609	104								
2	V2	18-I-85	63	168								
2	V3	18-I-85	76	84	1.000	7.723	0.691	0.001	0.690	0.456	0.001	0.455
		18-I-85	77	132								
2	H	14-I-30	38	240								
2	D2D	6x3.5x3/8	5	274	1.000	1.389	0.632	0.131	0.501	0.399	0.068	0.331
2		6x3.5x3/8	6	274								
2	D1D	5x3x5/16	7	274								
2		5x3x5/16	8	274	1.000	1.220	0.798	0.235	0.563	0.494	0.123	0.372

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
3	V1	18-I-85	92	170								
3	VM	2 Z 4x3	7634	85								
3		2 Z 4x3	7635	85								
3	HT	5x5x3/8	7622	120								
3		5x5x3/8	7623	120								
3	HB	1 C 10-15.3	7620	120	1.000	1.016	1.548	0.844	0.704	0.905	0.441	0.465
3		L 3x2x1/4	7621	120	1.000	1.016	1.546	0.845	0.701	0.904	0.441	0.463
3	HM1	L 3x2x1/4	7632	60								
3	HM2	L 3x2x1/4	7633	60								
3	D1A	L 3x21/2x1/4	7626	104								
3		L 3x21/2x1/4	7627	104								
3	D2A	L 3x21/2x1/4	7624	104								
3		L 3x21/2x1/4	7625	104								
3	D1B	L 3x21/2x1/4	7630	104								
3		L 3x21/2x1/4	7631	104								
3	D2B	L 3x21/2x1/4	7628	104								
3		L 3x21/2x1/4	7629	104								
3	V2	18-I-85	64	168								
3	V3	18-I-85	78	84	1.000	7.723	0.939	0.039	0.900	0.617	0.023	0.594
3		18-I-85	79	132	1.000	7.723	0.896	0.060	0.836	0.587	0.035	0.552
3	H	14-I-30	39	240								
4	V1	18-I-85	93	170								
4	VM	2 Z 4x3	7654	85								
4		2 Z 4x3	7655	85								
4	HT	5x5x3/8	7642	120								
4		5x5x3/8	7643	120								
4	HB	1 C 10-15.3	7640	120	1.000	1.016	1.561	0.845	0.716	0.914	0.441	0.473
4		L 3x2x1/4	7641	120	1.000	1.016	1.598	0.861	0.737	0.936	0.450	0.486
4	HM1	L 3x2x1/4	7652	60								
4	HM2	L 3x2x1/4	7653	60								
4	D1A	L 3x21/2x1/4	7646	104								
4		L 3x21/2x1/4	7647	104								
4	D2A	L 3x21/2x1/4	7644	104								
4		L 3x21/2x1/4	7645	104								
4	D1B	L 3x21/2x1/4	7650	104								
4		L 3x21/2x1/4	7651	104	1.000	0.753	0.520	0.472	0.049	0.279	0.246	0.032
4	D2B	L 3x21/2x1/4	7648	104								
4		L 3x21/2x1/4	7649	104								
4	V2	18-I-85	65	168								
4	V3	18-I-85	80	216								
4	H	14-I-30	40	240	1.000	1.488	0.513	0.405	0.108	0.283	0.211	0.071

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
5	V1	18-I-85	94	170								
5	VM	2 Z 4x3	7674	85								
5		2 Z 4x3	7675	85								
5	HT	5x5x3/8	7662	120								
5		5x5x3/8	7663	120								
5	HB	1 C 10-15.3	7660	120			1.916			0.635		
5		L 3x2x1/4	7661	120			2.461			0.652		
5	HM1	L 3x2x1/4	7672	60								
5	HM2	L 3x2x1/4	7673	60								
5	D1A	L 3x21/2x1/4	7666	104	1.000	0.753	0.632	0.605	0.026	0.333	0.316	0.017
5		L 3x21/2x1/4	7667	104								
5	D2A	L 3x21/2x1/4	7664	104								
5		L 3x21/2x1/4	7665	104								
5	D1B	L 3x21/2x1/4	7670	104								
5		L 3x21/2x1/4	7671	104	1.000	0.753	0.766	0.704	0.062	0.408	0.367	0.041
5	D2B	L 3x21/2x1/4	7668	104								
5		L 3x21/2x1/4	7669	104								
5	V2	18-I-85	66	168								
5	V3	18-I-85	81	216								
5	H	14-I-30	41	240	1.000	1.488	0.531	0.406	0.126	0.295	0.212	0.083
6	V1	18-I-85	95	170								
6	VM	2 Z 4x3	7694	85								
6		2 Z 4x3	7695	85								
6	HT	5x5x3/8	7682	120								
6		5x5x3/8	7683	120								
6	HB	1 C 10-15.3	7680	120	1.000	1.016	0.787	0.551	0.235	0.443	0.288	0.155
6		L 3x2x1/4	7681	120	1.000	1.016	0.783	0.543	0.240	0.442	0.284	0.158
6	HM1	L 3x2x1/4	7692	60								
6	HM2	L 3x2x1/4	7693	60								
6	D1A	L 3x21/2x1/4	7686	104								
6		L 3x21/2x1/4	7687	104								
6	D2A	L 3x21/2x1/4	7684	104								
6		L 3x21/2x1/4	7685	104								
6	D1B	L 3x21/2x1/4	7690	104								
6		L 3x21/2x1/4	7691	104								
6	D2B	L 3x21/2x1/4	7688	104								
6		L 3x21/2x1/4	7689	104								
6	V2	18-I-85	67	168								
6	V3	18-I-85	82	216								
6	H	14-I-30	42	240								
6	D1C	L 5x3x5/16	11	293	1.000	0.854	2.641	2.505	0.136	1.397	1.307	0.090
6		L 5x3x5/16	12	293	1.000	0.540	2.724	2.528	0.196	1.448	1.319	0.129
6	D2C	L 5x3x5/16	9	293	1.000	0.854	1.805	1.713	0.092	0.954	0.894	0.061
6		L 5x3x5/16	10	293	1.000	0.854	1.774	1.691	0.083	0.937	0.882	0.055
6	D1D	L 5x3x5/16	15	323			fa>Fe					
6		L 5x3x5/16	16	323			fa>Fe					
6	D2D	L 5x3x5/16	13	323			fa>Fe					
6		L 5x3x5/16	14	323			fa>Fe					

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
7	V1	18-I-85	96	170								
7	VM	2 Z 4x3	7714	85								
7		2 Z 4x3	7715	85								
7	HT	5x5x3/8	7702	120								
7		5x5x3/8	7703	120								
7	HB	1 C 10-15.3	7700	120	1.000	1.016	0.566	0.399	0.167	0.319	0.208	0.110
7		L 3x2x1/4	7701	120	1.000	1.016	0.554	0.401	0.153	0.310	0.209	0.101
7	HM1	L 3x2x1/4	7712	60								
7	HM2	L 3x2x1/4	7713	60								
7	D1A	L 3x21/2x1/4	7706	104	1.000	0.753	0.509	0.486	0.024	0.269	0.254	0.016
7		L 3x21/2x1/4	7707	104								
7	D2A	L 3x21/2x1/4	7704	104								
7		L 3x21/2x1/4	7705	104								
7	D1B	L 3x21/2x1/4	7710	104								
7		L 3x21/2x1/4	7711	104	1.000	0.753	0.610	0.568	0.042	0.324	0.296	0.028
7	D2B	L 3x21/2x1/4	7708	104								
7		L 3x21/2x1/4	7709	104								
7	V2	18-I-85	68	168								
7	V3	18-I-85	83	216								
7	H	14-I-30	43	240								
8	V1	18-I-85	97	170								
8	VM	2 Z 4x3	7734	85								
8		2 Z 4x3	7735	85								
8	HT	5x5x3/8	7722	120								
8		5x5x3/8	7723	120								
8	HB	1 C 10-15.3	7720	120	1.000	1.016	0.627	0.426	0.201	0.355	0.222	0.133
8		L 3x2x1/4	7721	120	1.000	1.016	0.640	0.452	0.188	0.360	0.236	0.124
8	HM1	L 3x2x1/4	7732	60								
8	HM2	L 3x2x1/4	7733	60								
8	D1A	L 3x21/2x1/4	7726	104								
8		L 3x21/2x1/4	7727	104								
8	D2A	L 3x21/2x1/4	7724	104								
8		L 3x21/2x1/4	7725	104								
8	D1B	L 3x21/2x1/4	7730	104								
8		L 3x21/2x1/4	7731	104								
8	D2B	L 3x21/2x1/4	7728	104								
8		L 3x21/2x1/4	7729	104								
8	V2	18-I-85	69	168								
8	V3	18-I-85	84	216								
8	H	14-I-30	44	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
9	V1	18-I-85	98	170								
9	VM	2 Z 4x3	7754	85								
9		2 Z 4x3	7755	85								
9	HT	5x5x3/8	7742	120								
9		5x5x3/8	7743	120								
9	HB	1 C 10-15.3	7740	120	1.000	1.016	0.677	0.460	0.217	0.383	0.240	0.143
9		L 3x2x1/4	7741	120	1.000	1.016	0.690	0.487	0.203	0.388	0.254	0.134
9	HM1	L 3x2x1/4	7752	60								
9	HM2	L 3x2x1/4	7753	60								
9	D1A	L 3x21/2x1/4	7746	104								
9		L 3x21/2x1/4	7747	104								
9	D2A	L 3x21/2x1/4	7744	104								
9		L 3x21/2x1/4	7745	104								
9	D1B	L 3x21/2x1/4	7750	104								
9		L 3x21/2x1/4	7751	104								
9	D2B	L 3x21/2x1/4	7748	104								
9		L 3x21/2x1/4	7749	104								
9	V2	18-I-85	70	168								
9	V3	18-I-85	85	216								
9	H	14-I-30	45	240								
10	V1	18-I-85	99	170								
10	VM	2 Z 4x3	7774	85								
10		2 Z 4x3	7775	85								
10	HT	5x5x3/8	7762	120								
10		5x5x3/8	7763	120								
10	HB	1 C 10-15.3	7760	120	1.000	1.016	0.756	0.505	0.251	0.429	0.264	0.166
10		L 3x2x1/4	7761	120	1.000	1.016	0.780	0.552	0.228	0.439	0.288	0.150
10	HM1	L 3x2x1/4	7772	60								
10	HM2	L 3x2x1/4	7773	60								
10	D1A	L 3x21/2x1/4	7766	104								
10		L 3x21/2x1/4	7767	104								
10	D2A	L 3x21/2x1/4	7764	104								
10		L 3x21/2x1/4	7765	104								
10	D1B	L 3x21/2x1/4	7770	104								
10		L 3x21/2x1/4	7771	104								
10	D2B	L 3x21/2x1/4	7768	104								
10		L 3x21/2x1/4	7769	104								
10	V2	18-I-85	71	168								
10	V3	18-I-85	86	216								
10	H	14-I-30	46	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length	K	r		AXL	B22		AXL	B22
11	V1	18-I-85	100	170								
11	VM	2 Z 4x3	7794	85								
11		2 Z 4x3	7795	85								
11	HT	5x5x3/8	7782	120								
11		5x5x3/8	7783	120								
11	HB	1 C 10-15.3	7780	120	1.000	1.016	1.020	0.624	0.396	0.587	0.326	0.261
11		L 3x2x1/4	7781	120	1.000	1.016	1.107	0.756	0.351	0.626	0.395	0.232
11	HM1	L 3x2x1/4	7792	60								
11	HM2	L 3x2x1/4	7793	60								
11	D1A	L 3x21/2x1/4	7786	104	1.000	0.753	0.822	0.778	0.044	0.435	0.406	0.029
11		L 3x21/2x1/4	7787	104	1.000	0.753	0.673	0.625	0.048	0.358	0.326	0.032
11	D2A	L 3x21/2x1/4	7784	104	1.000	0.753	0.826	0.775	0.051	0.438	0.404	0.034
11		L 3x21/2x1/4	7785	104	1.000	0.753	0.730	0.697	0.033	0.385	0.364	0.022
11	D1B	L 3x21/2x1/4	7790	104	1.000	0.753	0.749	0.703	0.046	0.397	0.367	0.030
11		L 3x21/2x1/4	7791	104	1.000	0.753	0.936	0.867	0.069	0.498	0.452	0.046
11	D2B	L 3x21/2x1/4	7788	104	1.000	0.753	0.620	0.590	0.030	0.328	0.308	0.020
11		L 3x21/2x1/4	7789	104	1.000	0.753	0.688	0.657	0.032	0.364	0.343	0.021
11	V2	18-I-85	72	168								
11	V3	18-I-85	87	216								
11	H	14-I-30	47	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
12	V1	18-I-85	101	170								
12	VM	2 Z 4x3	7814	85								
12		2 Z 4x3	7815	85								
12	HT	5x5x3/8	7802	120								
12		5x5x3/8	7803	120								
12	HB	1 C 10-20	7800	120	1.000	0.927	1.540	0.823	0.718	0.903	0.429	0.474
12		L 3x2x1/4	7801	120	1.000	0.927	1.597	0.848	0.750	0.937	0.442	0.495
12	HM1	L 3x2x1/4	7812	60								
12	HM2	L 3x2x1/4	7813	60								
12	D1A	L 3x21/2x1/4	7806	104								
12		L 3x21/2x1/4	7807	104								
12	D2A	L 3x21/2x1/4	7804	104								
12		L 3x21/2x1/4	7805	104								
12	D1B	L 3x21/2x1/4	7810	104								
12		L 3x21/2x1/4	7811	104	1.000	0.753	0.531	0.498	0.033	0.282	0.260	0.022
12	D2B	L 3x21/2x1/4	7808	104								
12		L 3x21/2x1/4	7809	104								
12	V2	18-I-85	73	168								
12	V3	18-I-85	88	216								
12	H	14-I-30	48	240								
12	D1C	6x31/2x3/8	19	293	1.000	1.389	0.881	0.788	0.093	0.473	0.411	0.061
12		6x31/2x3/8	20	293	1.000	1.389	0.855	0.794	0.061	0.455	0.414	0.040
12	D2C	5x3x5/16	17	293	1.000	1.220	1.614	1.393	0.221	0.873	0.727	0.146
12		5x3x5/16	18	293	1.000	1.220	1.515	1.386	0.129	0.808	0.723	0.085
12	D2D	5x3x5/16	21	323			fa>Fe					
12		5x3x5/16	22	323			fa>Fe					
12	D1D	6x31/2x3/8	23	323	1.000	1.389	1.969	1.537	0.432	1.087	0.802	0.285
12		6x31/2x3/8	24	323	1.000	1.389	2.083	1.544	0.539	1.161	0.806	0.356
END	EV1	18-I-64	102	170								
	EV2	18-I-64	74	168								
	EV3	18-I-64	89	216	1.000	1.694	0.835	0.673	0.162	0.458	0.351	0.107
Total Overstressed Members							30			4		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 6.1. Connection types for analysis, data taken from Hangar 45.

Connection Type	In plane of truss...	Joint ID Number	Elements Connectin	Member Section	Axial Tension	Stress Ratio *		Capacity Force Ratio **	
						Ten.	Comp.	A325	A307
1	T1	575	525	2L 8x6x7/16	39.6	< 0.5	0.352	0.408	0.900
			725	2L 5x3.5x5/16	48.3	< 0.5	0.401	0.356	0.784
			588	14-I-61		0.303	< 0.5		
2	T1	513	712	2L 4x3x5/16	18	< 0.5	< 0.5	0.309	0.682
			713	2L 4x3x5/16	12.3	< 0.5	0.497	0.211	0.466
			582	2L 6x3.5x5/16	14.9	< 0.5	< 0.5	0.256	0.564
			556	2L 6x6x1/2		< 0.5	0.591		
3	T1	515	583	2L 6x3.5x5/16	40.5	< 0.5	0.523	0.696	1.534
			715	2L 3x2x5/16	19.6	< 0.5	0.886	0.253	0.557
			558	2L 6x6x1/2		< 0.5	< 0.5		
4	T1	612	606	2L 3x2x1/4	6.55	< 0.5	< 0.5	0.113	0.248
			631	2L 3x2x1/4	1.23	< 0.5	< 0.5	0.021	0.047
			711	2L 4x3x5/16		< 0.5	< 0.5		
5	T1	553	626	2L 3x2x1/4	0.639	< 0.5	< 0.5	0.011	0.024
			577	2L 6x3.5x5/16	77.5	0.374	0.462	0.499	1.101
			703	2L 5x3x5/16	34	< 0.5	0.758	0.219	0.483
			502	2L 8x6x7/16		0.436	< 0.5		
6	T1	562	606	2L 3x2x1/4	6.62	< 0.5	< 0.5	0.114	0.251
			511	2L 8x6x1/2		0.395	< 0.5		
7	T1	674	574	2L 6x6x3/8	22.6	< 0.5	< 0.5	0.194	0.428
			600	18-I-85		< 0.5	< 0.5		
8	T1	559	548	2L 8x6x7/16	51.7	< 0.5	< 0.5	0.533	1.175
			748	2L 5x3.5x5/16	22.6	< 0.5	0.458	0.166	0.367
			600	18-I-85		< 0.5	< 0.5		
9	T2	179	376	2L	3.29	< 0.5	< 0.5	0.031	0.069
			359	18-I-47	17.7	< 0.5	< 0.5	0.067	0.148
			378	2L	9.04	< 0.5	0.644	0.085	0.188
			371	18-I-64		< 0.5	< 0.5		
10	T2	75	24	2L 8x6x9/16	32.9	< 0.5	< 0.5	0.283	0.623
			224	2L 6x3.5x3/8	13.4	< 0.5	< 0.5	0.077	0.169
			88	14-I-87		< 0.5	< 0.5		
11	T2	25	62	2L 8x6x9/16	22.9	< 0.5	< 0.5	0.086	0.191
			385	14-I-87		< 0.5	< 0.5		
12	T2	99	48	2L 8x6x9/16	18.8	< 0.5	< 0.5	0.138	0.305
			248	2L 6x4x3/8	16.5	< 0.5	< 0.5	0.085	0.188
			100	18-I-64		< 0.5	< 0.5		
13	T2	185	380	2L	13.5	< 0.5	0.528	0.127	0.281
			371	18-I-64		< 0.5	< 0.5		
14	T3	6470	9000	2C 12x25-	0	< 0.5	< 0.5	0.000	0.000
			7398	2L7x4x5/8	119	< 0.5	< 0.5	0.173	0.381
			7376	14-H-87		< 0.5	< 0.5		
15	T3	1525	7383	14x8-I-43	125	0.307	< 0.5	0.295	0.651
			7412	14x8-I-43	76.7	< 0.5	0.515	0.103	0.228
			7413	2L 5x3x5/16	22	< 0.5	< 0.5	0.104	0.229
			7364	14-H-78		< 0.5	0.369		

Connection	In plane of	Joint ID	Elements	Member	Axial	Stress	Ratio *	Capacity Force Ratio **	
Type	truss...	Number	Connectin	Section	Tension	Ten.	Comp.	A325	A307
16	T3	1025	7411	14x12-I-78	211	< 0.5	0.643	0.153	0.338
			7382	14x10-I-61	240	0.504	0.291	0.283	0.625
			7363	14-H-78		0.326	0.342		
17	T3	3025	7367	14-H-78	78.7	< 0.5	< 0.5	0.338	0.745
			7386	33-I-200		0.355	0.289		
18	T3	3075	7355	14-H-87	47.3	< 0.5	< 0.5	0.034	0.076
			7418	14x12-I-78	204	< 0.5	0.627	0.219	0.483
			7386	33-I-200		0.355	0.289		
19	T3	575	7350	2C 12x30-	39.4	< 0.5	< 0.5	0.085	0.187
			7351	14-H-87	155	< 0.5	< 0.5	0.133	0.294
			7403	2L 7x4x3/8	35.2	< 0.5	< 0.5	0.101	0.222
			7411	14x12-I-78	212	< 0.5	0.643	0.182	0.402
			7381	14-I-142		0.323	< 0.5		
20	T3	6476	7402	2L 7x4x3/8	34.4	< 0.5	< 0.5	0.099	0.217
			7403	2L 7x4x3/8	34.9	< 0.5	< 0.5	0.100	0.220
			7409	2L 7x4x3/8		< 0.5	< 0.5		
21	T3	75	7350	2C 12x30-	39.4	< 0.5	< 0.5	0.085	0.187
			7409	2L 7x4x3/8	74.2	< 0.5	< 0.5	0.147	0.324
			7378	14-H-87					
22	T3	25	7402	2L 7x4x3/8	34.1	< 0.5	< 0.5	0.098	0.215
			7362	2C 12x25-	80.3	< 0.5	< 0.5	0.207	0.456
			7407	2L 7x4x5/8	0	< 0.5	0.401	0.000	0.000
			7377	14-H-87		< 0.5	< 0.5		
23	T3	525	7410	2L 7x4x3/8	73.2	< 0.5	< 0.5	0.145	0.320
			7362	2C 12x25-	80.3	< 0.5	< 0.5	0.138	0.304
			7401	2L 7x4x5/8	109	< 0.5	< 0.5	0.216	0.476
			7363	14-H-78	194	0.317	0.323	0.227	0.501
			7380	14-I-142		0.328	0.354		
24	T3	6472	7400	2L 7x4x5/8	108	< 0.5	< 0.5	0.309	0.682
			7374	2L 7x4x5/8	20.5	< 0.5	< 0.5	0.053	0.116
			7405	2L 7x4x5/8	4.51	< 0.5	0.345	0.013	0.028
			7377	14-H-87		< 0.5	< 0.5		
25	SF	1051	7609	L 3x2.5x1/4	5	< 0.5	0.378	0.086	0.189
			7603	2L 5x5x3/8	36.3	< 0.5	< 0.5	0.468	1.031
			9	18-I-85		< 0.5	< 0.5		
26	SF	663	7821	12-I-40	21.6	< 0.5	< 0.5	0.086	0.189
			7556	2L 6x3.5x3/8	34.6	< 0.5	0.300	0.198	0.437
			4	18-I-85		< 0.5	< 0.5		
27	SF	6550	7747	L 3x2.5x1/4	2.8	< 0.5	< 0.5	0.048	0.106
			7748	L 3x2.5x1/4	3.3	< 0.5	< 0.5	0.057	0.125
			7754	2Z 4x3	1.4	< 0.5	< 0.5	0.024	0.053
			7740	C10x15.3 L 3x2x1/4		0.319	0.360		

Connection Type	In plane of truss...	Joint ID Number	Elements Connectin	Member Section	Axial Tension	Stress Ratio *		Capacity Force Ratio **	
						Ten.	Comp.	A325	A307
28	SF	6552	7745	L 3x2.5x1/4	2.5	< 0.5	< 0.5	0.043	0.095
			7750	L 3x2.5x1/4	2.2	< 0.5	< 0.5	0.038	0.083
			7755	2Z 4x3	1.6	< 0.5	< 0.5	0.027	0.061
			7742	2L 5x5x3/8		< 0.5	< 0.5		
29	SF	6551	7753	L 3x2x1/4	4.8	< 0.5	< 0.5	0.124	0.273
			7748	L 3x2.5x1/4	3.3	< 0.5	< 0.5	0.085	0.188
			7750	L 3x2.5x1/4	2.2	< 0.5	< 0.5	0.113	0.250
30	SF	6554	7752	L 3x2x1/4	4.8	< 0.5	< 0.5	0.082	0.182
			7753	L 3x2x1/4	4.8	< 0.5	< 0.5	0.124	0.273
			7755	2Z 4x3		< 0.5	< 0.5		
31	SF	6507	7574	2L 6x3.5x5/16	1.3	< 0.5	< 0.5	0.004	0.009
			36	18-I-85		< 0.5	< 0.5		
32	SF	167	7555	2L 6x3.5x3/8	34	< 0.5	0.290	0.107	0.236
			1	18-I-64		< 0.5	< 0.5		
33	SF	5663	7831	12-I-40	31.1	< 0.5	< 0.5	0.107	0.236
			7572	2L 5x3x5/16	11.1	< 0.5	< 0.5	0.105	0.231
			36	18-I-85		< 0.5	< 0.5		
34	SF	4501	7751	L 3x2.5x1/4 C 10x15.3	4.36	< 0.5	< 0.5	0.056	0.124
			7741	L 3x2x1/4	44.9	< 0.5	0.358	0.771	1.701
			30	18-I-85		< 0.5	< 0.5		
35	Bottom	-----	1	L 3.5x2.5.1/4					
			2	L 3.5x2.5.1/4					
			3	L 3.5x2.5.1/4					
			4	L 3.5x2.5.1/4					
			554	2L 6x6x3/8					
36	Bottom	-----	5	L 3.5x2.5.1/4					
			6	L 3.5x2.5.1/4					
			556	2L 6x6x1/2					
37	Bottom	-----	7	L 3.5x2.5.1/4					
			8	L 3.5x2.5.1/4					
			552	2L 6x6x3/8					
38	Bottom	-----	9	2L 5x3.5x3/8					
			10	L 3.5x2.5.1/4					
			554	2L 5x3.5x5/16					

* When the stress ratio is reported at < 0.5, this includes the factors of safety
** Ratio of Computed Tensile Forces to Total Shear Capacity of Rivets

Table 9.1. Hangars 43 and 47 Truss T1 with Knee Braces Maximum Wind, Tension.

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18- I -85	576	160						
1	HT l	8x6x7/16	501	120	0.563	0.193	0.370	0.360	0.116	0.244
	r	8x6x7/16	502	120	0.782	0.193	0.590	0.505	0.116	0.389
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.756	0.756	0.000	0.454	0.454	0.000
2	HT l	8x6x7/16	503	120	1.019	0.420	0.599	0.647	0.252	0.395
	r	8x6x7/16	504	120	1.018	0.419	0.599	0.647	0.251	0.395
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167	0.570	0.570	0.000	0.342	0.342	0.000
3	HT l	8x6x7/16	505	120	1.098	0.584	0.514	0.690	0.350	0.339
	r	8x6x7/16	506	120	1.097	0.584	0.514	0.690	0.350	0.339
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	1.124	0.677	0.447	0.701	0.406	0.295
	r	8x6x7/16	508	120	1.123	0.676	0.447	0.701	0.406	0.295
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	1.018	0.707	0.311	0.629	0.424	0.205
	r	8x6x1/2	510	120	1.018	0.707	0.311	0.629	0.424	0.205
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.886	0.674	0.212	0.544	0.404	0.140
	r	8x6x1/2	512	120	0.886	0.674	0.212	0.544	0.404	0.140
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	1.029	0.671	0.358	0.639	0.403	0.236
	r	8x6x1/2	514	120	1.029	0.671	0.358	0.639	0.403	0.236
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	1.112	0.576	0.536	0.699	0.346	0.354
	r	8x6x1/2	516	120	1.111	0.575	0.536	0.699	0.345	0.354
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187	0.565	0.565	0.000	0.339	0.339	0.000
9	HT l	8x6x7/16	517	120	1.012	0.427	0.585	0.642	0.256	0.386
	r	8x6x7/16	518	120	1.012	0.426	0.585	0.642	0.256	0.386
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.714	0.714	0.000	0.428	0.428	0.000
10	HT l	8x6x7/16	519	120	0.815	0.229	0.586	0.524	0.137	0.387
	r	8x6x7/16	520	120	0.814	0.228	0.586	0.524	0.137	0.387
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193	0.682	0.682	0.000	0.409	0.409	0.000
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.929	0.855	0.074	0.562	0.513	0.049
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.810	0.810	0.000	0.486	0.486	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.449	1.387	0.062	0.873	0.832	0.041
12	D b	5x31/2x5/16	723	156						
	t	5x31/2x5/16	724	156						
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	W14x61	588	200	0.700	0.700	0.000	0.420	0.420	0.000
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.449	1.387	0.062	0.873	0.832	0.041
13	D t	5x31/2x5/16	725	156						
	b	5x31/2x5/16	726	156						
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.810	0.810	0.000	0.486	0.486	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.929	0.855	0.074	0.562	0.513	0.049
14	D t	5x3x5/16	727	155						
	b	5x3x5/16	728	155						
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193	0.682	0.682	0.000	0.409	0.409	0.000
15	HT l	8x6x7/16	529	120	0.814	0.228	0.586	0.524	0.137	0.387
	r	8x6x7/16	530	120	0.815	0.229	0.586	0.524	0.137	0.387
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190	0.714	0.714	0.000	0.428	0.428	0.000
16	HT l	8x6x7/16	531	120	1.012	0.426	0.585	0.642	0.256	0.386
	r	8x6x7/16	532	120	1.012	0.427	0.585	0.642	0.256	0.386
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187	0.565	0.565	0.000	0.339	0.339	0.000
17	HT l	8x6x1/2	533	120	1.111	0.575	0.536	0.699	0.345	0.354
	r	8x6x1/2	534	120	1.112	0.576	0.536	0.699	0.346	0.354
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	1.029	0.671	0.358	0.639	0.403	0.236
	r	8x6x1/2	536	120	1.029	0.671	0.358	0.639	0.403	0.236
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			N0 FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.886	0.674	0.212	0.544	0.404	0.140
	r	8x6x1/2	538	120	0.886	0.674	0.212	0.544	0.404	0.140
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	1.018	0.707	0.311	0.629	0.424	0.205
	r	8x6x1/2	540	120	1.018	0.707	0.311	0.629	0.424	0.205
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	1.123	0.676	0.447	0.701	0.406	0.295
	r	8x6x7/16	542	120	1.124	0.677	0.447	0.701	0.406	0.295
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	1.097	0.584	0.514	0.690	0.350	0.339
	r	8x6x7/16	544	120	1.098	0.584	0.514	0.690	0.350	0.339
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167	0.570	0.570	0.000	0.342	0.342	0.000
23	HT l	8x6x7/16	545	120	1.018	0.419	0.599	0.647	0.251	0.395
	r	8x6x7/16	546	120	1.019	0.420	0.599	0.647	0.252	0.395
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163	0.756	0.756	0.000	0.454	0.454	0.000
24	HT l	8x6x7/16	547	120	0.783	0.193	0.590	0.505	0.116	0.389
	r	8x6x7/16	548	120	0.563	0.193	0.370	0.360	0.116	0.244
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144						
	t	5x31/2x5/16	748	144						
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
South End	1S	18-I-47	805	78						
		18-I-47	806	78						
		18-I-47	807	78						
		18-I-47	808	78						
	2S	24-I-74	809	78	0.530	0.052	0.477	0.346	0.031	0.315
		24-I-74	810	78						
		24-I-74	811	78						
		24-I-74	812	78	0.985	0.052	0.933	0.647	0.031	0.616
	3S	18-I-70	818	161						
	4S	18-I-70	817	181	0.601	0.000	0.601	0.397	0.000	0.397
	5S	18-I-85	822	43	0.660	0.081	0.579	0.431	0.049	0.382
	6S	18-I-85	821	109	1.075	0.181	0.894	0.699	0.109	0.590
		18-I-85	823	52	0.938	0.091	0.847	0.614	0.055	0.559
	S	18-I-85	820	181	0.846	0.116	0.731	0.552	0.070	0.482
North End	1N	18-I-47	835	78						
		18-I-47	836	78						
		18-I-47	837	78						
		18-I-47	838	78						
	2N	24-I-74	859	78	0.506	0.088	0.419	0.329	0.053	0.277
		24-I-74	860	78						
		24-I-74	861	78						
		24-I-74	862	78	0.627	0.054	0.573	0.411	0.032	0.378
	3N	18-I-70	868	161						
	4N	18-I-70	867	181						
	5N	18-I-85	873	43	0.544	0.110	0.434	0.352	0.066	0.286
	6N	18-I-85	872	109	1.074	0.215	0.860	0.697	0.129	0.568
		18-I-85	874	52	0.933	0.114	0.818	0.608	0.068	0.540
	7N	18-I-85	871	181	0.568	0.110	0.458	0.368	0.066	0.302
Knee Braces	K1	8x8x1/2	998	186	0.698	0.277	0.421	0.444	0.166	0.278
	K2	8x8x1/2	999	186	0.683	0.281	0.401	0.433	0.169	0.265
		Total Overstressed Members			31			0		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.2. Hangars 43 and 47 Truss T1 with Knee Braces Maximum Wind, Compression.

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT l	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	0.962	0.869	0.093	0.516	0.455	0.061
	b	5x31/2x5/16	702	144	1.000	1.328	0.913	0.824	0.089	0.490	0.431	0.059
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163								
2	HT l	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240								
2	D t	5x3x5/16	703	145	1.000	1.091	1.837	1.643	0.194	0.985	0.857	0.128
	b	5x3x5/16	704	145	1.000	1.091	1.821	1.631	0.190	0.976	0.851	0.125
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167								
3	HT l	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	0.544	0.407	0.137	0.303	0.212	0.090
3	D t	31/2x21/2x5/16	705	146			fa>Fe			1.000		
	b	31/2x21/2x5/16	706	146			fa>Fe			0.975		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170								
4	HT l	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.037	0.773	0.264	0.578	0.403	0.174
4	D t	3x21/2x5/16	707	147			fa>Fe			0.650		
	b	3x21/2x5/16	708	147			fa>Fe			0.608		
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173								
5	HT l	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	0.942	0.746	0.196	0.519	0.389	0.129
5	D t	3x2x5/16	709	148	1.000	0.903	0.825	0.626	0.198	0.457	0.327	0.131
	b	3x2x5/16	710	148	1.000	0.903	0.598	0.453	0.145	0.332	0.236	0.096
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT l	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	1.032	0.792	0.240	0.572	0.413	0.158
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	K	r	Computed			NO FOS *		
							Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.753	0.576	0.176	0.417	0.301	0.116
7	D b	4x3x5/16	713	151	1.000	1.168	1.051	0.770	0.282	0.588	0.402	0.186
	t	4x3x5/16	714	151	1.000	1.168	1.178	0.849	0.330	0.661	0.443	0.218
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	0.668	0.668	0.000	0.349	0.349	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240								
8	D b	3x2x5/16	715	152			fa>Fe			1.118		
	t	3x2x5/16	716	152			fa>Fe			1.148		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	1.301	1.301	0.000	0.679	0.679	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			1.259		
	t	31/2x21/2x5/16	718	153			fa>Fe			1.269		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.331	1.331	0.000	0.694	0.694	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			1.367		
	t	4x3x5/16	720	154			fa>Fe			1.374		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.296	1.296	0.000	0.676	0.676	0.000
11	HT l	8x6x7/16	521	120	1.000	2.562	0.669	0.023	0.645	0.438	0.013	0.426
	r	8x6x7/16	522	120	1.000	2.562	0.697	0.024	0.673	0.458	0.013	0.444
11	HB	6x6x3/8	561	240	1.000	1.879	0.541	0.451	0.090	0.295	0.235	0.059
11	D b	5x3x5/16	721	155			fa>Fe			1.413		
	t	5x3x5/16	722	155			fa>Fe			1.413		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.332	1.340	0.000	0.699	0.699	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	1.044	0.341	0.703	0.653	0.189	0.464
	r	8x6x7/16	524	120	1.000	2.562	0.818	0.341	0.477	0.504	0.189	0.315
12	HB	6x6x3/8	562	240	1.000	1.879	0.803	0.683	0.120	0.436	0.356	0.079
12	D b	5x31/2x5/16	723	156			fa>Fe			0.528		
	t	5x31/2x5/16	724	156			fa>Fe			0.536		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
Bay	Mem.	Section	#	Length (in)	K	r						
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.818	0.341	0.477	0.504	0.189	0.315
	r	8x6x7/16	526	120	1.000	2.562	1.044	0.341	0.703	0.653	0.189	0.464
13	HB	6x6x3/8	563	240	1.000	1.879	0.813	0.683	0.130	0.442	0.356	0.086
13	D t	5x31/2x5/16	725	156			fa>Fe			0.536		
	b	5x31/2x5/16	726	156			fa>Fe			0.528		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.684	1.684	0.000	0.879	0.879	0.000
14	HT l	8x6x7/16	527	120	1.000	2.562	0.818	0.341	0.477	0.504	0.189	0.315
	r	8x6x7/16	528	120	1.000	2.562	1.044	0.341	0.703	0.653	0.189	0.464
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			fa>Fe			1.412		
	b	5x3x5/16	728	155			fa>Fe			1.413		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.573	1.573	0.000	0.821	0.821	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			1.374		
	b	4x3x5/16	730	154			fa>Fe			1.367		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.760	1.760	0.000	0.918	0.918	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			1.269		
	b	31/2x21/2x5/16	732	153			fa>Fe			1.259		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.669	1.669	0.000	0.871	0.871	0.000
17	HT l	8x6x1/2	533	120								
	r	8x6x1/2	534	120								
17	HB	6x6x1/2	567	240								
17	D t	3x2x5/16	733	152			fa>Fe			1.148		
	b	3x2x5/16	734	152			fa>Fe			1.118		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	1.026	1.026	0.000	0.535	0.535	0.000
18	HT l	8x6x1/2	535	120								
	r	8x6x1/2	536	120								
18	HB	6x6x1/2	568	240	1.000	1.861	0.753	0.576	0.176	0.417	0.301	0.116
18	D t	4x3x5/16	735	151	1.000	1.272	1.178	0.849	0.330	0.661	0.443	0.218
	b	4x3x5/16	736	151	1.000	1.272	1.052	0.770	0.282	0.588	0.402	0.186
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
Bay	Mem.	Section	#	Length (in)	K	r						
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	1.032	0.792	0.240	0.572	0.413	0.158
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120	1.000	2.319	0.598	0.453	0.145	0.346	0.250	0.096
	r	8x6x1/2	540	120	1.000	2.319	0.825	0.627	0.198	0.477	0.346	0.131
20	HB	6x6x1/2	570	240	1.000	1.861	0.942	0.746	0.196	0.519	0.389	0.129
20	D b	3x2x5/16	739	148								
	t	3x2x5/16	740	148								
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173	2.278	1.670	0.706	0.706	0.000	0.368	0.368	0.000
21	HT l	8x6x7/16	541	120	1.000	2.562	0.503	0.311	0.192	0.300	0.173	0.127
	r	8x6x7/16	542	120	1.000	2.562	0.503	0.312	0.192	0.300	0.173	0.127
21	HB	6x6x3/8	571	240	1.000	1.879	1.037	0.773	0.264	0.578	0.403	0.174
21	D b	3x21/2x5/16	741	147			fa>Fe			0.608		
	t	3x21/2x5/16	742	147			fa>Fe			0.650		
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.406	1.406	0.000	0.734	0.734	0.000
22	HT l	8x6x7/16	543	120								
	r	8x6x7/16	544	120								
22	HB	6x6x3/8	572	240	1.000	1.879	0.544	0.407	0.137	0.303	0.212	0.090
22	D b	31/2x21/2x5/16	743	146			fa>Fe			0.975		
	t	31/2x21/2x5/16	744	146			fa>Fe			1.000		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.474	1.474	0.000	0.769	0.769	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.821	1.631	0.190	0.976	0.851	0.125
	t	5x3x5/16	746	145	1.000	1.091	1.838	1.645	0.194	0.986	0.858	0.128
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.140	1.140	0.000	0.595	0.595	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	0.913	0.824	0.089	0.490	0.431	0.059
	t	5x31/2x5/16	748	144	1.000	1.328	0.962	0.869	0.093	0.516	0.455	0.061
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
South End	1S	18-I-47	805	78								
		18-I-47	806	78								
		18-I-47	807	78								
		18-I-47	808	78								
	2S	24-I-74	809	78								
		24-I-74	810	78								
		24-I-74	811	78								
		24-I-74	812	78	1.000	9.542	0.821	0.020	0.801	0.540	0.012	0.529
	3S	18-I-70	818	161								
	4S	18-I-70	817	181	1.000	7.485	0.890	0.005	0.885	0.587	0.003	0.584
	5S	18-I-85	822	43								
	6S	18-I-85	821	109								
		18-I-85	823	52								
	7S	18-I-85	820	181	1.000	7.723	0.884	0.084	0.800	0.576	0.048	0.528
North End	1N	18-I-47	835	78								
		18-I-47	836	78								
		18-I-47	837	78								
		18-I-47	838	78								
	2N	24-I-74	859	78	1.000	9.542	0.642	0.026	0.616	0.422	0.015	0.407
		24-I-74	860	78	1.000	9.542	0.506	0.026	0.480	0.332	0.015	0.317
		24-I-74	861	78								
		24-I-74	862	78	1.000	9.542	0.839	0.026	0.814	0.553	0.015	0.537
	3N	18-I-70	868	161								
	4N	18-I-70	867	181	1.000	7.485	1.079	0.086	0.993	0.705	0.049	0.655
	5N	18-I-85	873	43								
	6N	18-I-85	872	109	1.000	2.611	0.795	0.119	0.676	0.513	0.067	0.446
		18-I-85	874	52	1.000	2.611	0.685	0.043	0.642	0.449	0.025	0.424
	7N	18-I-85	871	181	1.000	7.723	0.723	0.107	0.615	0.468	0.062	0.406
Knee Braces	K1	8x8x1/2	998	186								
	K2	8x8x1/2	999	186	1.000	2.505	0.619	0.236	0.383	0.380	0.127	0.253
		Total Overstressed Members					54			18		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.3. Hangars 43 and 47 Truss T1 with Knee Braces Average Wind, Tension.

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18- I -85	576	160						
1	HT l	8x6x7/16	501	120						
	r	8x6x7/16	502	120	0.628	0.142	0.486	0.406	0.085	0.321
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.647	0.647	0.000	0.388	0.388	0.000
2	HT l	8x6x7/16	503	120	0.827	0.328	0.499	0.526	0.197	0.329
	r	8x6x7/16	504	120	0.826	0.327	0.499	0.526	0.196	0.329
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167						
3	HT l	8x6x7/16	505	120	0.862	0.454	0.408	0.542	0.272	0.269
	r	8x6x7/16	506	120	0.834	0.512	0.322	0.520	0.307	0.213
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	0.834	0.512	0.322	0.520	0.307	0.213
	r	8x6x7/16	508	120	0.833	0.511	0.322	0.519	0.307	0.213
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	0.766	0.524	0.242	0.474	0.314	0.160
	r	8x6x1/2	510	120	0.765	0.523	0.242	0.474	0.314	0.160
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.679	0.509	0.170	0.418	0.305	0.112
	r	8x6x1/2	512	120	0.679	0.509	0.170	0.418	0.305	0.112
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	0.763	0.492	0.271	0.474	0.295	0.179
	r	8x6x1/2	514	120	0.763	0.492	0.271	0.474	0.295	0.179
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	0.822	0.449	0.373	0.516	0.269	0.246
	r	8x6x1/2	516	120	0.822	0.449	0.373	0.516	0.269	0.246
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187						
9	HT l	8x6x7/16	517	120	0.759	0.354	0.405	0.480	0.212	0.267
	r	8x6x7/16	518	120	0.759	0.354	0.405	0.480	0.212	0.267
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190						
10	HT l	8x6x7/16	519	120	0.636	0.227	0.409	0.406	0.136	0.270
	r	8x6x7/16	520	120	0.635	0.226	0.409	0.406	0.136	0.270
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193						
11	HT l	8x6x7/16	521	120	0.514	0.063	0.451	0.335	0.038	0.298
	r	8x6x7/16	522	120	0.522	0.063	0.459	0.341	0.038	0.303
11	HB	6x6x3/8	561	240	0.616	0.553	0.063	0.373	0.332	0.042
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.542	0.542	0.000	0.325	0.325	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	0.957	0.906	0.051	0.577	0.544	0.034
12	D b	5x31/2x5/16	723	156						
	t	5x31/2x5/16	724	156						
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	W14x61	588	200						
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	0.955	0.906	0.049	0.576	0.544	0.032
13	D t	5x31/2x5/16	725	156	0.677	0.619	0.058	0.410	0.371	0.038
	b	5x31/2x5/16	726	156	0.677	0.619	0.058	0.410	0.371	0.038
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197						
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.654	0.604	0.050	0.395	0.362	0.033
14	D t	5x3x5/16	727	155	0.584	0.535	0.049	0.353	0.321	0.032
	b	5x3x5/16	728	155	0.594	0.545	0.049	0.359	0.327	0.032
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193						
15	HT l	8x6x7/16	529	120	0.527	0.154	0.373	0.339	0.092	0.246
	r	8x6x7/16	530	120	0.528	0.155	0.373	0.339	0.093	0.246
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190						
16	HT l	8x6x7/16	531	120	0.633	0.267	0.366	0.402	0.160	0.242
	r	8x6x7/16	532	120	0.633	0.267	0.366	0.402	0.160	0.242
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187						
17	HT l	8x6x1/2	533	120	0.705	0.358	0.347	0.444	0.215	0.229
	r	8x6x1/2	534	120	0.705	0.358	0.347	0.444	0.215	0.229
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	0.640	0.411	0.229	0.398	0.247	0.151
	r	8x6x1/2	536	120	0.640	0.411	0.229	0.398	0.247	0.151
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.561	0.413	0.148	0.345	0.248	0.098
	r	8x6x1/2	538	120	0.561	0.413	0.148	0.345	0.248	0.098
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	0.654	0.431	0.223	0.406	0.259	0.147
	r	8x6x1/2	540	120	0.654	0.431	0.223	0.406	0.259	0.147
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	0.697	0.405	0.292	0.436	0.243	0.193
	r	8x6x7/16	542	120	0.697	0.405	0.292	0.436	0.243	0.193
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	0.688	0.351	0.337	0.433	0.211	0.222
	r	8x6x7/16	544	120	0.688	0.351	0.337	0.433	0.211	0.222
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167						
23	HT l	8x6x7/16	545	120	0.628	0.247	0.381	0.400	0.148	0.251
	r	8x6x7/16	546	120	0.630	0.247	0.383	0.401	0.148	0.253
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163						
24	HT l	8x6x7/16	547	120						
	r	8x6x7/16	548	120						
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144						
	t	5x31/2x5/16	748	144						
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	Computed Stress Ratio	Computed AXL	Computed B33	NO FOS * Stress Ratio	NO FOS * AXL	NO FOS * B33
South End	1S	18-I-47	805	78						
		18-I-47	806	78						
		18-I-47	807	78						
		18-I-47	808	78						
	2S	24-I-74	809	78						
		24-I-74	810	78						
		24-I-74	811	78						
		24-I-74	812	78	0.955	0.052	0.903	0.627	0.031	0.596
	3S	18-I-70	818	161						
	4S	18-I-70	817	181	0.601	0.000	0.601	0.397	0.000	0.397
	5S	18-I-85	822	43	0.563	0.092	0.471	0.366	0.055	0.311
	6S	18-I-85	821	109						
		18-I-85	823	52	0.933	0.093	0.840	0.610	0.056	0.554
	S	18-I-85	820	181	0.826	0.119	0.707	0.538	0.071	0.467
North End	1N	18-I-47	835	78						
		18-I-47	836	78						
		18-I-47	837	78						
		18-I-47	838	78						
	2N	24-I-74	859	78						
		24-I-74	860	78						
		24-I-74	861	78						
		24-I-74	862	78	0.616	0.049	0.567	0.404	0.029	0.374
	3N	18-I-70	868	161						
	4N	18-I-70	867	181						
	5N	18-I-85	873	43						
	6N	18-I-85	872	109	0.659	0.121	0.538	0.428	0.073	0.355
		18-I-85	874	52	0.566	0.052	0.514	0.370	0.031	0.339
	7N	18-I-85	871	181	0.557	0.084	0.473	0.363	0.050	0.312
Knee Braces	K1	8x8x1/2	998	186	0.693	0.249	0.444	0.442	0.149	0.293
	K2	8x8x1/2	999	186						
		Total Overstressed Members			0			0		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.4. Hangars 43 and 47 Truss T1 with Knee Braces Average Wind, Compression.

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT l	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	0.799	0.724	0.073	0.427	0.379	0.048
	b	5x31/2x5/16	702	144	1.000	1.328	0.742	0.672	0.070	0.398	0.352	0.046
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163								
2	HT l	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240								
2	D t	5x3x5/16	703	145	1.000	1.091	1.489	1.366	0.123	0.794	0.713	0.081
	b	5x3x5/16	704	145	1.000	1.091	1.455	1.335	0.119	0.775	0.697	0.079
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167	1.769	1.378	0.617	0.617	0.000	0.322	0.322	0.000
3	HT l	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	0.554	0.435	0.120	0.306	0.227	0.079
3	D t	31/2x21/2x5/16	705	146			fa>Fe			0.789		
	b	31/2x21/2x5/16	706	146			fa>Fe			0.749		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170								
4	HT l	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	0.914	0.714	0.200	0.505	0.373	0.132
4	D t	3x21/2x5/16	707	147			9.270			0.491		
	b	3x21/2x5/16	708	147			2.073			0.464		
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173								
5	HT l	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	0.786	0.645	0.141	0.430	0.337	0.093
5	D t	3x2x5/16	709	148	1.000	0.903	0.677	0.533	0.144	0.373	0.278	0.095
	b	3x2x5/16	710	148	1.000	0.903	0.538	0.418	0.120	0.297	0.218	0.079
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT l	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	0.827	0.666	0.161	0.454	0.347	0.106
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.618	0.489	0.129	0.340	0.255	0.085
7	D b	4x3x5/16	713	151	1.000	1.168	0.785	0.608	0.176	0.433	0.317	0.116
	t	4x3x5/16	714	151	1.000	1.168	0.861	0.668	0.193	0.476	0.349	0.127
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	0.901	0.901	0.000	0.470	0.470	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240								
8	D b	3x2x5/16	715	152			fa>Fe			0.817		
	t	3x2x5/16	716	152			fa>Fe			0.828		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	1.389	1.389	0.000	0.725	0.725	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			0.853		
	t	31/2x21/2x5/16	718	153			fa>Fe			0.854		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.313	1.313	0.000	0.685	0.685	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			0.903		
	t	4x3x5/16	720	154			fa>Fe			0.910		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.283	1.283	0.000	0.669	0.669	0.000
11	HT l	8x6x7/16	521	120								
	r	8x6x7/16	522	120								
11	HB	6x6x3/8	561	240	1.000	1.879	0.545	0.454	0.091	0.297	0.237	0.060
11	D b	5x3x5/16	721	155			2.266			0.938		
	t	5x3x5/16	722	155			2.270			0.939		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.321	1.321	0.000	0.689	0.689	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	0.625	0.189	0.436	0.393	0.105	0.288
	r	8x6x7/16	524	120	1.000	2.562	0.605	0.240	0.364	0.374	0.133	0.240
12	HB	6x6x3/8	562	240	1.000	1.879	0.805	0.685	0.120	0.437	0.357	0.079
12	D b	5x31/2x5/16	723	156			2.824			0.387		
	t	5x31/2x5/16	724	156			3.049			0.392		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120								
	r	8x6x7/16	526	120								
13	HB	6x6x3/8	563	240	1.000	1.879	0.816	0.685	0.131	0.444	0.357	0.086
13	D t	5x31/2x5/16	725	156			1.935			0.339		
	b	5x31/2x5/16	726	156			1.858			0.333		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.697	1.697	0.000	0.885	0.885	0.000
14	HT l	8x6x7/16	527	120								
	r	8x6x7/16	528	120								
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			1.846			0.822		
	b	5x3x5/16	728	155			1.831			0.817		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.588	1.588	0.000	0.829	0.829	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			0.834		
	b	4x3x5/16	730	154			fa>Fe			0.823		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.781	1.781	0.000	0.929	0.929	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			0.738		
	b	31/2x21/2x5/16	732	153			fa>Fe			0.723		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.698	1.698	0.000	0.886	0.886	0.000
17	HT l	8x6x1/2	533	120								
	r	8x6x1/2	534	120								
17	HB	6x6x1/2	567	240								
17	D t	3x2x5/16	733	152			fa>Fe			0.719		
	b	3x2x5/16	734	152			fa>Fe			0.692		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	1.052	1.052	0.000	0.549	0.549	0.000
18	HT l	8x6x1/2	535	120								
	r	8x6x1/2	536	120								
18	HB	6x6x1/2	568	240								
18	D t	4x3x5/16	735	151	1.000	1.272	0.618	0.487	0.130	0.340	0.254	0.086
	b	4x3x5/16	736	151	1.000	1.272	0.557	0.445	0.113	0.307	0.232	0.075
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length (in)	K	r	Computed: Stress Ratio	Computed: AXL	Computed: B33	N0 FOS *: Stress Ratio	N0 FOS *: AXL	N0 FOS *: B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240								
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120								
	r	8x6x1/2	540	120								
20	HB	6x6x1/2	570	240								
20	D b	3x2x5/16	739	148	1.000	0.903	0.516	0.405	0.110	0.284	0.211	0.073
	t	3x2x5/16	740	148	1.000	0.903	0.660	0.526	0.134	0.363	0.274	0.088
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173	2.278	1.670	0.680	0.680	0.000	0.355	0.355	0.000
21	HT l	8x6x7/16	541	120	1.000	2.562	0.512	0.322	0.191	0.305	0.179	0.126
	r	8x6x7/16	542	120	1.000	2.562	0.512	0.322	0.191	0.305	0.179	0.126
21	HB	6x6x3/8	571	240								
21	D b	3x21/2x5/16	741	147	1.000	0.937	0.975	0.790	0.350	0.643	0.412	0.231
	t	3x21/2x5/16	742	147	1.000	0.937	1.139	0.790	0.350	0.643	0.412	0.231
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.379	1.379	0.000	0.719	0.719	0.000
22	HT l	8x6x7/16	543	120								
	r	8x6x7/16	544	120								
22	HB	6x6x3/8	572	240								
22	D b	31/2x21/2x5/16	743	146			1.986			0.621		
	t	31/2x21/2x5/16	744	146			2.338			0.642		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.453	1.453	0.000	0.758	0.758	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.033	0.961	0.072	0.549	0.501	0.048
	t	5x3x5/16	746	145	1.000	1.091	1.051	0.978	0.073	0.558	0.510	0.048
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.127	1.127	0.000	0.588	0.588	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	0.501	0.455	0.045	0.268	0.238	0.030
	t	5x31/2x5/16	748	144	1.000	1.328	0.535	0.489	0.046	0.286	0.256	0.030
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South End	1S	18-I-47	805	78								
		18-I-47	806	78								
		18-I-47	807	78								
		18-I-47	808	78								
	2S	24-I-74	809	78								
		24-I-74	810	78								
		24-I-74	811	78								
		24-I-74	812	78	1.000	9.542	0.821	0.020	0.801	0.540	0.012	0.529
	3S	18-I-70	818	161								
	4S	18-I-70	817	181	1.000	7.485	0.865	0.008	0.857	0.570	0.005	0.566
	5S	18-I-85	822	43								
	6S	18-I-85	821	109								
		18-I-85	823	52								
	7S	18-I-85	820	181	1.000	7.723	0.884	0.084	0.800	0.576	0.048	0.528
North End	1N	18-I-47	835	78								
		18-I-47	836	78								
		18-I-47	837	78								
		18-I-47	838	78								
	2N	24-I-74	859	78	1.000	9.542	0.642	0.026	0.616	0.422	0.015	0.407
		24-I-74	860	78	1.000	9.542	0.506	0.026	0.480	0.332	0.015	0.317
		24-I-74	861	78								
		24-I-74	862	78	1.000	9.542	0.839	0.026	0.814	0.553	0.015	0.537
	3N	18-I-70	868	161								
	4N	18-I-70	867	181	1.000	7.485	1.079	0.086	0.993	0.705	0.049	0.655
	5N	18-I-85	873	43								
	6N	18-I-85	872	109	1.000	2.611	0.795	0.119	0.676	0.513	0.067	0.446
		18-I-85	874	52	1.000	2.611	0.685	0.043	0.642	0.449	0.025	0.424
	7N	18-I-85	871	181	1.000	7.723	0.723	0.107	0.615	0.468	0.062	0.406
Knee Braces	K1	8x8x1/2	998	186	1.000	2.505	0.619	0.236	0.383	0.380	0.127	0.253
	K2	8x8x1/2	999	186								
		Total Overstressed Members					30			0		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.5. Hangars 44 and 45 Truss T1 with Knee Braces Maximum Wind, Tension.

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18- I -85	576	160						
1	HT l	8x6x7/16	501	120	0.616	0.219	0.396	0.393	0.131	0.261
	r	8x6x7/16	502	120	0.792	0.219	0.573	0.510	0.131	0.378
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.746	0.746	0.000	0.448	0.448	0.000
2	HT l	8x6x7/16	503	120	1.037	0.442	0.594	0.657	0.265	0.392
	r	8x6x7/16	504	120	1.036	0.442	0.594	0.657	0.265	0.392
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167	0.561	0.561	0.000	0.337	0.337	0.000
3	HT l	8x6x7/16	505	120	1.112	0.603	0.509	0.698	0.362	0.336
	r	8x6x7/16	506	120	1.112	0.603	0.509	0.698	0.362	0.336
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	1.133	0.692	0.441	0.706	0.415	0.291
	r	8x6x7/16	508	120	1.133	0.691	0.441	0.706	0.415	0.291
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	1.025	0.718	0.306	0.633	0.431	0.202
	r	8x6x1/2	510	120	1.024	0.718	0.306	0.633	0.431	0.202
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.891	0.682	0.209	0.547	0.409	0.138
	r	8x6x1/2	512	120	0.891	0.682	0.209	0.547	0.409	0.138
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	1.042	0.679	0.363	0.647	0.407	0.240
	r	8x6x1/2	514	120	1.042	0.678	0.363	0.646	0.407	0.240
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	1.123	0.580	0.543	0.706	0.348	0.358
	r	8x6x1/2	516	120	1.123	0.580	0.543	0.706	0.348	0.358
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187	0.573	0.576	0.000	0.346	0.346	0.000
9	HT l	8x6x7/16	517	120	1.020	0.428	0.592	0.648	0.257	0.391
	r	8x6x7/16	518	120	1.019	0.428	0.592	0.648	0.257	0.391
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.722	0.722	0.000	0.433	0.433	0.000
10	HT l	8x6x7/16	519	120	0.818	0.227	0.590	0.526	0.136	0.389
	r	8x6x7/16	520	120	0.817	0.227	0.590	0.526	0.136	0.389
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193	0.689	0.689	0.000	0.413	0.413	0.000
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.933	0.858	0.075	0.564	0.515	0.050
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.817	0.817	0.000	0.490	0.490	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.457	1.394	0.063	0.878	0.836	0.042
12	D b	5x31/2x5/16	723	156						
	t	5x31/2x5/16	724	156						
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200	0.704	0.704	0.000	0.422	0.422	0.000
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.457	1.394	0.062	0.877	0.836	0.041
13	D t	5x31/2x5/16	725	156						
	b	5x31/2x5/16	726	156						
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.813	0.813	0.000	0.488	0.488	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.935	0.861	0.074	0.565	0.517	0.049
14	D t	5x3x5/16	727	155						
	b	5x3x5/16	728	155						
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193	0.685	0.685	0.000	0.411	0.411	0.000
15	HT l	8x6x7/16	529	120	0.807	0.221	0.586	0.519	0.133	0.387
	r	8x6x7/16	530	120	0.808	0.222	0.586	0.520	0.133	0.387
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190	0.717	0.717	0.000	0.430	0.430	0.000
16	HT l	8x6x7/16	531	120	1.006	0.420	0.586	0.639	0.252	0.387
	r	8x6x7/16	532	120	1.007	0.421	0.586	0.639	0.253	0.387
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187	0.568	0.568	0.000	0.341	0.341	0.000
17	HT l	8x6x1/2	533	120	1.107	0.570	0.573	0.720	0.342	0.378
	r	8x6x1/2	534	120	1.108	0.571	0.537	0.697	0.343	0.354
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	1.026	0.667	0.359	0.637	0.400	0.237
	r	8x6x1/2	536	120	1.026	0.667	0.359	0.637	0.400	0.237
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			N0 FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.880	0.670	0.210	0.541	0.402	0.139
	r	8x6x1/2	538	120	0.880	0.670	0.210	0.541	0.402	0.139
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	1.012	0.704	0.308	0.626	0.422	0.203
	r	8x6x1/2	540	120	1.012	0.705	0.308	0.626	0.423	0.203
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	1.119	0.675	0.444	0.698	0.405	0.293
	r	8x6x7/16	542	120	1.119	0.676	0.444	0.699	0.406	0.293
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	1.095	0.584	0.511	0.688	0.350	0.337
	r	8x6x7/16	544	120	1.095	0.585	0.511	0.688	0.351	0.337
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167	0.567	0.567	0.000	0.340	0.340	0.000
23	HT l	8x6x7/16	545	120	1.017	0.421	0.596	0.646	0.253	0.393
	r	8x6x7/16	546	120	1.018	0.422	0.596	0.647	0.253	0.393
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163	0.753	0.753	0.000	0.452	0.452	0.000
24	HT l	8x6x7/16	547	120	0.781	0.196	0.585	0.504	0.118	0.386
	r	8x6x7/16	548	120	0.570	0.197	0.373	0.364	0.118	0.246
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144						
	t	5x31/2x5/16	748	144						
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
South	7S	18-I-85	820	289	1.330	0.174	1.156	0.867	0.104	0.763
End		18-I-85	823	95	1.200	0.101	1.099	0.786	0.061	0.725
North	1N	18-I-47	835	78						
End		18-I-47	836	78						
		18-I-47	837	78						
		18-I-47	838	78						
	2N	24-I-74	859	78	1.288	0.057	1.230	0.846	0.034	0.812
		24-I-74	860	78	0.571	0.057	0.514	0.373	0.034	0.339
		24-I-74	861	78	0.532	0.057	0.475	0.348	0.034	0.314
		24-I-74	862	78	1.054	0.046	1.009	0.694	0.028	0.666
	3N	18-I-70	868	161						
	4N	18-I-70	867	181	1.199	0.015	1.184	0.790	0.009	0.781
	5N	18-I-85	873	43	0.568	0.079	0.489	0.370	0.047	0.323
	6N	18-I-85	872	109	1.219	0.181	1.038	0.794	0.109	0.685
		18-I-85	874	52	1.062	0.077	0.985	0.696	0.046	0.650
	7N	18-I-85	871	181	1.077	0.102	0.976	0.705	0.061	0.644
Knee	K1	8x8x1/2	998	186	0.762	0.205	0.557	0.491	0.123	0.368
Braces	K2	8x8x1/2	999	186	0.800	0.289	0.511	0.511	0.173	0.337
Total Overstressed Members					38			0		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.6. Hangars 44 and 45 Truss T1 with Knee Braces Maximum Wind, Compression.

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT l	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	1.090	0.982	0.107	0.585	0.514	0.071
	b	5x31/2x5/16	702	144	1.000	1.328	1.041	0.938	0.103	0.559	0.491	0.068
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163	1.552	1.378	0.883	0.883	0.000	0.461	0.461	0.000
2	HT l	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240								
2	D t	5x3x5/16	703	145	1.000	1.091	1.807	1.620	0.187	0.969	0.845	0.123
	b	5x3x5/16	704	145	1.000	1.091	1.789	1.605	0.184	0.959	0.837	0.121
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167	1.769	1.378	1.241	1.241	0.000	0.647	0.647	0.000
3	HT l	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	0.656	0.535	0.121	0.359	0.279	0.080
3	D t	31/2x21/2x5/16	705	146			fa>Fe			0.979		
	b	31/2x21/2x5/16	706	146			fa>Fe			0.953		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170	1.933	1.378	1.080	1.080	0.000	0.563	0.563	0.000
4	HT l	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.118	0.828	0.290	0.623	0.432	0.191
4	D t	3x21/2x5/16	707	147			fa>Fe			0.628		
	b	3x21/2x5/16	708	147			fa>Fe			0.584		
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173	2.325	1.607	0.653	0.653	0.000	0.341	0.341	0.000
5	HT l	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	0.989	0.781	0.208	0.545	0.407	0.137
5	D t	3x2x5/16	709	148	1.000	0.903	0.743	0.569	0.174	0.412	0.297	0.115
	b	3x2x5/16	710	148	1.000	0.903	0.524	0.393	0.131	0.292	0.205	0.086
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT l	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	1.075	0.822	0.253	0.596	0.429	0.167
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.776	0.594	0.182	0.430	0.310	0.120
7	D b	4x3x5/16	713	151	1.000	1.168	1.099	0.798	0.301	0.615	0.416	0.199
	t	4x3x5/16	714	151	1.000	1.168	1.231	0.876	0.355	0.691	0.457	0.234
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	1.099	1.099	0.000	0.573	0.573	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240								
8	D b	3x2x5/16	715	152			fa>Fe			1.141		
	t	3x2x5/16	716	152			fa>Fe			1.171		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	1.816	1.816	0.000	0.947	0.947	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			1.278		
	t	31/2x21/2x5/16	718	153			fa>Fe			1.288		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.680	1.680	0.000	0.877	0.877	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			1.384		
	t	4x3x5/16	720	154			fa>Fe			1.395		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.558	1.558	0.000	0.813	0.813	0.000
11	HT l	8x6x7/16	521	120	1.000	2.562	0.678	0.029	0.650	0.445	0.016	0.429
	r	8x6x7/16	522	120	1.000	2.562	0.707	0.030	0.677	0.463	0.017	0.447
11	HB	6x6x3/8	561	240	1.000	1.879	0.556	0.466	0.090	0.303	0.243	0.059
11	D b	5x3x5/16	721	155			fa>Fe			1.426		
	t	5x3x5/16	722	155			fa>Fe			1.426		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.537	1.537	0.000	0.802	0.802	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	1.058	0.349	0.709	0.662	0.194	0.468
	r	8x6x7/16	524	120	1.000	2.562	0.829	0.350	0.480	0.511	0.194	0.317
12	HB	6x6x3/8	562	240	1.000	1.879	0.811	0.692	0.119	0.440	0.361	0.079
12	D b	5x31/2x5/16	723	156			fa>Fe			0.534		
	t	5x31/2x5/16	724	156			fa>Fe			0.539		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.829	0.352	0.477	0.510	0.196	0.315
	r	8x6x7/16	526	120	1.000	2.562	1.057	0.351	0.706	0.661	0.195	0.466
13	HB	6x6x3/8	563	240	1.000	1.879	0.821	0.692	0.129	0.446	0.361	0.085
13	D t	5x31/2x5/16	725	156			fa>Fe			0.536		
	b	5x31/2x5/16	726	156			fa>Fe			0.531		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.647	1.647	0.000	0.859	0.859	0.000
14	HT l	8x6x7/16	527	120	1.000	2.562	0.707	0.033	0.674	0.463	0.018	0.445
	r	8x6x7/16	528	120	1.000	2.562	0.678	0.033	0.646	0.445	0.018	0.426
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			fa>Fe			1.416		
	b	5x3x5/16	728	155			fa>Fe			1.416		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.528	1.528	0.000	0.797	0.797	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			1.383		
	b	4x3x5/16	730	154			fa>Fe			1.372		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.698	1.698	0.000	0.886	0.886	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			1.276		
	b	31/2x21/2x5/16	732	153			fa>Fe			1.265		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.584	1.584	0.000	0.826	0.826	0.000
17	HT l	8x6x1/2	533	120								
	r	8x6x1/2	534	120								
17	HB	6x6x1/2	567	240								
17	D t	3x2x5/16	733	152			fa>Fe			1.156		
	b	3x2x5/16	734	152			fa>Fe			1.126		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	0.928	0.928	0.000	0.484	0.484	0.000
18	HT l	8x6x1/2	535	120								
	r	8x6x1/2	536	120								
18	HB	6x6x1/2	568	240	1.000	1.861	0.755	0.578	0.177	0.418	0.302	0.117
18	D t	4x3x5/16	735	151	1.000	1.272	1.197	0.859	0.338	0.672	0.448	0.223
	b	4x3x5/16	736	151	1.000	1.272	1.068	0.781	0.288	0.598	0.408	0.190
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	1.040	0.798	0.242	0.576	0.416	0.160
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120								
	r	8x6x1/2	540	120								
20	HB	6x6x1/2	570	240	1.000	1.861	0.952	0.753	0.199	0.524	0.393	0.131
20	D b	3x2x5/16	739	148	1.000	0.903	0.570	0.431	0.139	0.317	0.225	0.092
	t	3x2x5/16	740	148	1.000	0.903	0.793	0.605	0.188	0.440	0.316	0.124
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173	2.278	1.670	0.869	0.869	0.000	0.453	0.453	0.000
21	HT l	8x6x7/16	541	120	1.000	2.562	0.511	0.303	0.209	0.306	0.168	0.138
	r	8x6x7/16	542	120	1.000	2.562	0.525	0.316	0.209	0.314	0.176	0.138
21	HB	6x6x3/8	571	240	1.000	1.879	1.075	0.799	0.276	0.599	0.417	0.182
21	D b	3x21/2x5/16	741	147			fa>Fe			0.598		
	t	3x21/2x5/16	742	147			fa>Fe			0.641		
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.575	1.575	0.000	0.822	0.822	0.000
22	HT l	8x6x7/16	543	120								
	r	8x6x7/16	544	120								
22	HB	6x6x3/8	572	240	1.000	1.879	0.589	0.469	0.120	0.324	0.245	0.079
22	D b	31/2x21/2x5/16	743	146			fa>Fe			0.966		
	t	31/2x21/2x5/16	744	146			fa>Fe			0.993		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.610	1.610	0.000	0.840	0.840	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.799	1.613	0.186	0.964	0.842	0.123
	t	5x3x5/16	746	145	1.000	1.091	1.817	1.628	0.189	0.974	0.849	0.125
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	1.214	1.214	0.000	0.633	0.633	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	0.952	0.859	0.093	0.511	0.450	0.061
	t	5x31/2x5/16	748	144	1.000	1.328	1.001	0.904	0.097	0.537	0.473	0.064
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South	7S	18-I-85	820	289	1.000	7.723	1.004	0.083	0.921	0.655	0.047	0.608
		18-I-85	823	95	1.000	7.723	0.895	0.021	0.874	0.589	0.012	0.577
North End	1N	18-I-47	835	78	1.000	7.262	0.529	0.013	0.516	0.348	0.008	0.341
		18-I-47	836	78								
		18-I-47	837	78								
		18-I-47	838	78	1.000	7.262	0.523	0.013	0.510	0.344	0.008	0.337
	2N	24-I-74	859	78	1.000	9.542	1.381	0.017	1.363	0.910	0.010	0.900
		24-I-74	860	78	1.000	9.542	0.746	0.033	0.713	0.490	0.020	0.471
		24-I-74	861	78	1.000	9.542	0.628	0.017	0.610	0.413	0.010	0.403
		24-I-74	862	78	1.000	9.542	1.252	0.033	1.219	0.824	0.020	0.805
	3N	18-I-70	868	161								
	4N	18-I-70	867	181	1.000	7.485	1.560	0.117	1.443	1.020	0.067	0.952
	5N	18-I-85	873	43								
	6N	18-I-85	872	109	1.000	2.611	1.014	0.120	0.894	0.657	0.067	0.590
		18-I-85	874	52	1.000	2.611	0.871	0.021	0.850	0.573	0.012	0.561
	7N	18-I-85	871	181	1.000	7.723	1.404	0.142	1.263	0.915	0.082	0.834
Knee Braces	K1	8x8x1/2	998	186	1.000	2.505	0.707	0.198	0.508	0.442	0.106	0.335
	K2	8x8x1/2	999	186	1.000	2.505	0.838	0.315	0.523	0.514	0.169	0.345
		Total Overstressed Members					65			17		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

All Sections are Double Angles Unless Otherwise Noted

Table 9.7. Hangars 44 and 45 Truss T1 with Knee Braces Average Wind, Tension.

					Computed			NO FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
1	V	18-I-85	576	160						
1	HT l	8x6x7/16	501	120						
	r	8x6x7/16	502	120	0.608	0.154	0.454	0.392	0.092	0.300
1	HB	6x6x3/8	551	240						
1	D t	5x31/2x5/16	701	144						
	b	5x31/2x5/16	702	144						
1	BV	3x2x1/4	601	82						
1	BD	3x2x1/4	626	146						
2	V	6x3-1/2x5/16	577	163	0.624	0.624	0.000	0.374	0.374	0.000
2	HT l	8x6x7/16	503	120	0.810	0.331	0.479	0.515	0.199	0.316
	r	8x6x7/16	504	120	0.810	0.331	0.479	0.515	0.199	0.316
2	HB	6x6x3/8	552	240						
2	D t	5x3x5/16	703	145						
	b	5x3x5/16	704	145						
2	BV	3x2x1/4	602	83						
2	BD	3x2x1/4	627	147						
3	V	6x31/2x5/16	578	167						
3	HT l	8x6x7/16	505	120	0.834	0.448	0.386	0.524	0.269	0.255
	r	8x6x7/16	506	120	0.833	0.447	0.386	0.523	0.268	0.255
3	HB	6x6x3/8	553	240						
3	D t	31/2x21/2x5/16	705	146						
	b	31/2x21/2x5/16	706	146						
3	BV	3x2x1/4	603	85						
3	BD	3x2x1/4	628	148						
4	V	6x3-1/2x5/16	579	170						
4	HT l	8x6x7/16	507	120	0.816	0.489	0.327	0.509	0.293	0.216
	r	8x6x7/16	508	120	0.816	0.489	0.327	0.509	0.293	0.216
4	HB	6x6x3/8	554	240						
4	D t	3x21/2x5/16	707	147						
	b	3x21/2x5/16	708	147						
4	BV	3x2x1/4	604	87						
4	BD	3x2x1/4	629	149						
5	V	6x31/2x5/16	580	173						
5	HT l	8x6x1/2	509	120	0.745	0.513	0.232	0.461	0.308	0.153
	r	8x6x1/2	510	120	0.744	0.512	0.232	0.460	0.307	0.153
5	HB	6x6x1/2	555	240						
5	D t	3x2x5/16	709	148						
	b	3x2x5/16	710	148						
5	BV	3x2x1/4	605	88						
5	BD	3x2x1/4	630	150						
6	V	6x31/2x5/16	581	177						
6	HT l	8x6x1/2	511	120	0.653	0.492	0.161	0.401	0.295	0.106
	r	8x6x1/2	512	120	0.653	0.492	0.161	0.401	0.295	0.106
6	HB	6x6x1/2	556	240						
6	D t	4x3x5/16	711	149						
	b	4x3x5/16	712	149						
6	BV	3x2x1/4	606	90						
6	BD	3x2x1/4	631	151						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	582	180						
7	HT l	8x6x1/2	513	120	0.746	0.490	0.256	0.463	0.294	0.169
	r	8x6x1/2	514	120	0.746	0.490	0.256	0.463	0.294	0.169
7	HB	6x6x1/2	557	240						
7	D b	4x3x5/16	713	151						
	t	4x3x5/16	714	151						
7	BV	3x2x1/4	607	90						
7	BD	3x2x1/4	632	149						
8	V	6x31/2x5/16	583	183						
8	HT l	8x6x1/2	515	120	0.806	0.427	0.379	0.506	0.256	0.250
	r	8x6x1/2	516	120	0.806	0.427	0.379	0.506	0.256	0.250
8	HB	6x6x1/2	558	240						
8	D b	3x2x5/16	715	152						
	t	3x2x5/16	716	152						
8	BV	3x2x1/4	608	92						
8	BD	3x2x1/4	633	150						
9	V	6x31/2x5/16	584	187						
9	HT l	8x6x7/16	517	120	0.739	0.327	0.412	0.468	0.196	0.272
	r	8x6x7/16	518	120	0.738	0.326	0.412	0.468	0.196	0.272
9	HB	6x6x3/8	559	240						
9	D b	31/2x21/2x5/16	717	153						
	t	31/2x21/2x5/16	718	153						
9	BV	3x2x1/4	609	93						
9	BD	3x2x1/4	634	151						
10	V	6x31/2x5/16	585	190	0.500	0.500	0.000	0.300	0.300	0.000
10	HT l	8x6x7/16	519	120	0.607	0.193	0.414	0.389	0.116	0.273
	r	8x6x7/16	520	120	0.607	0.193	0.414	0.389	0.116	0.273
10	HB	6x6x3/8	560	240						
10	D b	4x3x5/16	719	154						
	t	4x3x5/16	720	154						
10	BV	3x2x1/4	610	95						
10	BD	3x2x1/4	635	152						
11	V	6x4x3/8	586	193						
11	HT l	8x6x7/16	521	120						
	r	8x6x7/16	522	120						
11	HB	6x6x3/8	561	240	0.681	0.620	0.061	0.412	0.372	0.040
11	D b	5x3x5/16	721	155						
	t	5x3x5/16	722	155						
11	BV	3x2x1/4	611	97						
11	BD	3x2x1/4	636	153						
12	V	6x4x3/8	587	197	0.557	0.557	0.000	0.334	0.334	0.000
12	HT l	8x6x7/16	523	120						
	r	8x6x7/16	524	120						
12	HB	6x6x3/8	562	240	1.035	0.983	0.052	0.624	0.590	0.034
12	D b	5x31/2x5/16	723	156	0.514	0.471	0.043	0.311	0.283	0.028
	t	5x31/2x5/16	724	156	0.517	0.474	0.043	0.313	0.284	0.028
12	BV	3x2x1/4	612	98						
12	BD	3x2x1/4	637	154						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			N0 FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length (in)	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200						
13	HT l	8x6x7/16	525	120						
	r	8x6x7/16	526	120						
13	HB	6x6x3/8	563	240	1.035	0.983	0.052	0.624	0.590	0.034
13	D t	5x31/2x5/16	725	156						
	b	5x31/2x5/16	726	156						
13	BV	3x2x1/4	613	98						
13	BD	3x2x1/4	638	154						
14	V	6x4x3/8	589	197	0.556	0.556	0.000	0.334	0.334	0.000
14	HT l	8x6x7/16	527	120						
	r	8x6x7/16	528	120						
14	HB	6x6x3/8	564	240	0.681	0.620	0.061	0.412	0.372	0.040
14	D t	5x3x5/16	727	155						
	b	5x3x5/16	728	155						
14	BV	3x2x1/4	614	97						
14	BD	3x2x1/4	639	153						
15	V	6x4x3/8	590	193						
15	HT l	8x6x7/16	529	120	0.606	0.192	0.414	0.388	0.115	0.273
	r	8x6x7/16	530	120	0.606	0.192	0.414	0.388	0.115	0.273
15	HB	6x6x3/8	565	240						
15	D t	4x3x5/16	729	154						
	b	4x3x5/16	730	154						
15	BV	3x2x1/4	615	95						
15	BD	3x2x1/4	640	152						
16	V	6x31/2x5/16	591	190						
16	HT l	8x6x7/16	531	120	0.737	0.325	0.412	0.467	0.195	0.272
	r	8x6x7/16	532	120	0.738	0.326	0.412	0.468	0.196	0.272
16	HB	6x6x3/8	566	240						
16	D t	31/2x21/2x5/16	731	153						
	b	31/2x21/2x5/16	732	153						
16	BV	3x2x1/4	616	93						
16	BD	3x2x1/4	641	151						
17	V	6x31/2x5/16	592	187						
17	HT l	8x6x1/2	533	120	0.803	0.425	0.378	0.504	0.255	0.249
	r	8x6x1/2	534	120	0.804	0.426	0.378	0.505	0.256	0.249
17	HB	6x6x1/2	567	240						
17	D t	3x2x5/16	733	152						
	b	3x2x5/16	734	152						
17	BV	3x2x1/4	617	92						
17	BD	3x2x1/4	642	150						
18	V	6x31/2x5/16	593	183						
18	HT l	8x6x1/2	535	120	0.750	0.480	0.270	0.466	0.288	0.178
	r	8x6x1/2	536	120	0.750	0.480	0.270	0.466	0.288	0.178
18	HB	6x6x1/2	568	240						
18	D t	4x3x5/16	735	151						
	b	4x3x5/16	736	151						
18	BV	3x2x1/4	618	90						
18	BD	3x2x1/4	643	149						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
					Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length (in)		AXL	B33		AXL	B33
19	V	6x31/2x5/16	594	180						
19	HT l	8x6x1/2	537	120	0.651	0.490	0.161	0.400	0.294	0.106
	r	8x6x1/2	538	120	0.651	0.490	0.161	0.400	0.294	0.106
19	HB	6x6x1/2	569	240						
19	D b	4x3x5/16	737	149						
	t	4x3x5/16	738	149						
19	BV	3x2x1/4	619	90						
19	BD	3x2x1/4	644	149						
20	V	6x31/2x5/16	595	177						
20	HT l	8x6x1/2	539	120	0.743	0.510	0.233	0.460	0.306	0.154
	r	8x6x1/2	540	120	0.743	0.510	0.233	0.460	0.306	0.154
20	HB	6x6x1/2	570	240						
20	D b	3x2x5/16	739	148						
	t	3x2x5/16	740	148						
20	BV	3x2x1/4	620	88						
20	BD	3x2x1/4	645	148						
21	V	6x31/2x5/16	596	173						
21	HT l	8x6x7/16	541	120	0.822	0.497	0.325	0.513	0.298	0.215
	r	8x6x7/16	542	120	0.822	0.497	0.325	0.513	0.298	0.215
21	HB	6x6x3/8	571	240						
21	D b	3x21/2x5/16	741	147						
	t	3x21/2x5/16	742	147						
21	BV	3x2x1/4	621	87						
21	BD	3x2x1/4	646	147						
22	V	6x31/2x5/16	597	170						
22	HT l	8x6x7/16	543	120	0.844	0.434	0.410	0.531	0.260	0.271
	r	8x6x7/16	544	120	0.844	0.434	0.410	0.531	0.260	0.271
22	HB	6x6x3/8	572	240						
22	D b	31/2x21/2x5/16	743	146						
	t	31/2x21/2x5/16	744	146						
22	BV	3x2x1/4	622	85						
22	BD	3x2x1/4	647	146						
23	V	6x31/2x5/16	598	167						
23	HT l	8x6x7/16	545	120	0.809	0.306	0.503	0.516	0.184	0.332
	r	8x6x7/16	546	120	0.809	0.306	0.503	0.516	0.184	0.332
23	HB	6x6x3/8	573	240						
23	D b	5x3x5/16	745	145						
	t	5x3x5/16	746	145						
23	BV	3x2x1/4	623	83						
23	BD	3x2x1/4	648	145						
24	V	6x31/2x5/16	599	163	0.654	0.654	0.000	0.392	0.392	0.000
24	HT l	8x6x7/16	547	120	0.621	0.118	0.503	0.403	0.071	0.332
	r	8x6x7/16	548	120						
24	HB	6x6x3/8	574	240						
24	D b	5x31/2x5/16	747	144						
	t	5x31/2x5/16	748	144						
24	BV	3x2x1/4	624	82						
24	BD	3x2x1/4	649	144						
End	EV	18-I-85	600	160						

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
South End	7S	18-I-85	820	289	1.330	0.174	1.156	0.867	0.104	0.763
		18-I-85	823	95	1.200	0.101	1.099	0.786	0.061	0.725
North End	1N	18-I-47	835	78						
		18-I-47	836	78						
		18-I-47	837	78						
		18-I-47	838	78						
	2N	24-I-74	859	78	1.287	0.057	1.230	0.846	0.034	0.812
		24-I-74	860	78	0.571	0.057	0.514	0.373	0.034	0.339
		24-I-74	861	78	0.532	0.057	0.475	0.348	0.034	0.314
		24-I-74	862	78	1.055	0.046	1.009	0.694	0.028	0.666
	3N	18-I-70	868	161						
	4N	18-I-70	867	181	1.199	0.015	1.184	0.790	0.009	0.781
	5N	18-I-85	873	43	0.568	0.079	0.489	0.370	0.047	0.323
	6N	18-I-85	872	109	1.219	0.181	1.038	0.794	0.109	0.685
		18-I-85	874	52	1.062	0.077	0.985	0.696	0.046	0.650
	7N	18-I-85	871	181	1.078	0.102	0.976	0.705	0.061	0.644
Knee Braces	K1	8x8x1/2	998	186	0.762	0.205	0.557	0.491	0.123	0.368
	K2	8x8x1/2	999	186	0.800	0.289	0.511	0.511	0.173	0.337
Total Overstressed Members					10			0		

* Factor of Safety for Bending is 1.5, for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.8. Hangars 44 and 45 Truss T1 with Knee Braces Average Wind, Compression.

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V	18- I -85	576	160								
1	HT l	8x6x7/16	501	120								
	r	8x6x7/16	502	120								
1	HB	6x6x3/8	551	240								
1	D t	5x31/2x5/16	701	144	1.000	1.328	0.885	0.805	0.080	0.474	0.422	0.053
	b	5x31/2x5/16	702	144	1.000	1.328	0.829	0.752	0.077	0.445	0.394	0.051
1	BV	3x2x1/4	601	82								
1	BD	3x2x1/4	626	146								
2	V	6x3-1/2x5/16	577	163	1.552	1.378	0.885	0.885	0.000	0.462	0.462	0.000
2	HT l	8x6x7/16	503	120								
	r	8x6x7/16	504	120								
2	HB	6x6x3/8	552	240								
2	D t	5x3x5/16	703	145	1.000	1.091	1.421	1.308	0.114	0.758	0.682	0.075
	b	5x3x5/16	704	145	1.000	1.091	1.383	1.272	0.110	0.736	0.664	0.073
2	BV	3x2x1/4	602	83								
2	BD	3x2x1/4	627	147								
3	V	6x31/2x5/16	578	167	1.769	1.378	1.257	1.257	0.000	0.656	0.656	0.000
3	HT l	8x6x7/16	505	120								
	r	8x6x7/16	506	120								
3	HB	6x6x3/8	553	240	1.000	1.879	0.683	0.557	0.125	0.373	0.291	0.083
3	D t	31/2x21/2x5/16	705	146			8.023			0.736		
	b	31/2x21/2x5/16	706	146			2.300			0.698		
3	BV	3x2x1/4	603	85								
3	BD	3x2x1/4	628	148								
4	V	6x3-1/2x5/16	579	170	1.933	1.378	1.099	1.099	0.000	0.573	0.573	0.000
4	HT l	8x6x7/16	507	120								
	r	8x6x7/16	508	120								
4	HB	6x6x3/8	554	240	1.000	1.879	1.046	0.815	0.231	0.578	0.425	0.152
4	D t	3x21/2x5/16	707	147			2.300			0.468		
	b	3x21/2x5/16	708	147	1.000	0.937	1.519	0.876	0.643	0.881	0.457	0.424
4	BV	3x2x1/4	604	87								
4	BD	3x2x1/4	629	149								
5	V	6x31/2x5/16	580	173	2.325	1.607	0.673	0.673	0.000	0.351	0.351	0.000
5	HT l	8x6x1/2	509	120								
	r	8x6x1/2	510	120								
5	HB	6x6x1/2	555	240	1.000	1.861	0.858	0.707	0.151	0.469	0.369	0.100
5	D t	3x2x5/16	709	148	1.000	0.903	0.601	0.474	0.127	0.331	0.247	0.084
	b	3x2x5/16	710	148								
5	BV	3x2x1/4	605	88								
5	BD	3x2x1/4	630	150								
6	V	6x31/2x5/16	581	177								
6	HT l	8x6x1/2	511	120								
	r	8x6x1/2	512	120								
6	HB	6x6x1/2	556	240	1.000	1.861	0.879	0.712	0.167	0.482	0.371	0.110
6	D t	4x3x5/16	711	149								
	b	4x3x5/16	712	149								
6	BV	3x2x1/4	606	90								
6	BD	3x2x1/4	631	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
7	V	6x31/2x5/16	582	180								
7	HT l	8x6x1/2	513	120								
	r	8x6x1/2	514	120								
7	HB	6x6x1/2	557	240	1.000	1.861	0.630	0.499	0.131	0.347	0.260	0.086
7	D b	4x3x5/16	713	151	1.000	1.168	0.899	0.694	0.204	0.497	0.362	0.135
	t	4x3x5/16	714	151	1.000	1.168	0.979	0.753	0.226	0.542	0.393	0.149
7	BV	3x2x1/4	607	90								
7	BD	3x2x1/4	632	149								
8	V	6x31/2x5/16	583	183	2.249	1.670	1.003	1.003	0.000	0.523	0.523	0.000
8	HT l	8x6x1/2	515	120								
	r	8x6x1/2	516	120								
8	HB	6x6x1/2	558	240								
8	D b	3x2x5/16	715	152			fa>Fe			0.886		
	t	3x2x5/16	716	152			fa>Fe			0.896		
8	BV	3x2x1/4	608	92								
8	BD	3x2x1/4	633	150								
9	V	6x31/2x5/16	584	187	2.359	1.670	1.707	1.707	0.000	0.891	0.891	0.000
9	HT l	8x6x7/16	517	120								
	r	8x6x7/16	518	120								
9	HB	6x6x3/8	559	240								
9	D b	31/2x21/2x5/16	717	153			fa>Fe			0.921		
	t	31/2x21/2x5/16	718	153			fa>Fe			0.921		
9	BV	3x2x1/4	609	93								
9	BD	3x2x1/4	634	151								
10	V	6x31/2x5/16	585	190	1.953	1.670	1.569	1.569	0.000	0.819	0.819	0.000
10	HT l	8x6x7/16	519	120								
	r	8x6x7/16	520	120								
10	HB	6x6x3/8	560	240								
10	D b	4x3x5/16	719	154			fa>Fe			0.958		
	t	4x3x5/16	720	154			fa>Fe			0.959		
10	BV	3x2x1/4	610	95								
10	BD	3x2x1/4	635	152								
11	V	6x4x3/8	586	193	2.400	2.131	1.475	1.475	0.000	0.770	0.770	0.000
11	HT l	8x6x7/16	521	120								
	r	8x6x7/16	522	120	1.000	2.562	0.506	0.069	0.437	0.327	0.038	0.288
11	HB	6x6x3/8	561	240								
11	D b	5x3x5/16	721	155			2.394			0.968		
	t	5x3x5/16	722	155			2.394			0.968		
11	BV	3x2x1/4	611	97								
11	BD	3x2x1/4	636	153								
12	V	6x4x3/8	587	197	2.178	2.131	1.483	1.483	0.000	0.774	0.774	0.000
12	HT l	8x6x7/16	523	120	1.000	2.562	0.736	0.283	0.453	0.456	0.157	0.299
	r	8x6x7/16	524	120	1.000	2.562	0.585	0.283	0.302	0.357	0.157	0.199
12	HB	6x6x3/8	562	240	1.000	1.879	0.687	0.587	0.100	0.372	0.306	0.066
12	D b	5x31/2x5/16	723	156			3.248			0.396		
	t	5x31/2x5/16	724	156			3.613			0.402		
12	BV	3x2x1/4	612	98								
12	BD	3x2x1/4	637	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			N0 FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	W14x61	588	200								
13	HT l	8x6x7/16	525	120	1.000	2.562	0.581	0.298	0.283	0.352	0.166	0.187
	r	8x6x7/16	526	120	1.000	2.562	0.723	0.298	0.425	0.446	0.166	0.281
13	HB	6x6x3/8	563	240	1.000	1.879	0.690	0.587	0.104	0.375	0.306	0.069
13	D t	5x31/2x5/16	725	156			3.580			0.401		
	b	5x31/2x5/16	726	156			3.223			0.396		
13	BV	3x2x1/4	613	98								
13	BD	3x2x1/4	638	154								
14	V	6x4x3/8	589	197	2.099	1.673	1.261	1.261	0.000	0.658	0.658	0.000
14	HT l	8x6x7/16	527	120	1.000	2.562	0.508	0.099	0.409	0.325	0.055	0.270
	r	8x6x7/16	528	120								
14	HB	6x6x3/8	564	240								
14	D t	5x3x5/16	727	155			2.388			0.966		
	b	5x3x5/16	728	155			2.387			0.966		
14	BV	3x2x1/4	614	97								
14	BD	3x2x1/4	639	153								
15	V	6x4x3/8	590	193	2.323	2.131	1.242	1.242	0.000	0.648	0.648	0.000
15	HT l	8x6x7/16	529	120								
	r	8x6x7/16	530	120								
15	HB	6x6x3/8	565	240								
15	D t	4x3x5/16	729	154			fa>Fe			0.942		
	b	4x3x5/16	730	154			fa>Fe			0.936		
15	BV	3x2x1/4	615	95								
15	BD	3x2x1/4	640	152								
16	V	6x31/2x5/16	591	190	1.908	1.670	1.307	1.307	0.000	0.682	0.682	0.000
16	HT l	8x6x7/16	531	120								
	r	8x6x7/16	532	120								
16	HB	6x6x3/8	566	240								
16	D t	31/2x21/2x5/16	731	153			fa>Fe			0.866		
	b	31/2x21/2x5/16	732	153			fa>Fe			0.864		
16	BV	3x2x1/4	616	93								
16	BD	3x2x1/4	641	151								
17	V	6x31/2x5/16	592	187	2.317	2.131	1.368	1.368	0.000	0.714	0.714	0.000
17	HT l	8x6x1/2	533	120								
	r	8x6x1/2	534	120								
17	HB	6x6x1/2	567	240								
17	D t	3x2x5/16	733	152			fa>Fe			0.827		
	b	3x2x5/16	734	152			fa>Fe			0.816		
17	BV	3x2x1/4	617	92								
17	BD	3x2x1/4	642	150								
18	V	6x31/2x5/16	593	183	2.222	1.670	0.826	0.826	0.000	0.431	0.431	0.000
18	HT l	8x6x1/2	535	120								
	r	8x6x1/2	536	120								
18	HB	6x6x1/2	568	240	1.000	1.861	0.525	0.407	0.118	0.290	0.212	0.078
18	D t	4x3x5/16	735	151	1.000	1.272	0.860	0.669	0.191	0.475	0.349	0.126
	b	4x3x5/16	736	151	1.000	1.272	0.784	0.609	0.175	0.433	0.318	0.116
18	BV	3x2x1/4	618	90								
18	BD	3x2x1/4	643	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
Bay	Mem.	Section	#	Length (in)	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	594	180								
19	HT l	8x6x1/2	537	120								
	r	8x6x1/2	538	120								
19	HB	6x6x1/2	569	240	1.000	1.861	0.729	0.584	0.144	0.400	0.305	0.095
19	D b	4x3x5/16	737	149								
	t	4x3x5/16	738	149								
19	BV	3x2x1/4	619	90								
19	BD	3x2x1/4	644	149								
20	V	6x31/2x5/16	595	177								
20	HT l	8x6x1/2	539	120								
	r	8x6x1/2	540	120								
20	HB	6x6x1/2	570	240	1.000	1.861	0.684	0.560	0.157	0.396	0.292	0.104
20	D b	3x2x5/16	739	148								
	t	3x2x5/16	740	148								
20	BV	3x2x1/4	620	88								
20	BD	3x2x1/4	645	148								
21	V	6x31/2x5/16	596	173	2.278	1.670	0.890	0.890	0.000	0.464	0.464	0.000
21	HT l	8x6x7/16	541	120								
	r	8x6x7/16	542	120								
21	HB	6x6x3/8	571	240	1.000	1.879	0.799	0.642	0.157	0.439	0.335	0.104
21	D b	3x21/2x5/16	741	147	1.000	0.937	1.552	0.881	0.671	0.903	0.460	0.443
	t	3x21/2x5/16	742	147			2.430			0.470		
21	BV	3x2x1/4	621	87								
21	BD	3x2x1/4	646	147								
22	V	6x31/2x5/16	597	170	1.884	1.378	1.282	1.282	0.000	0.669	0.669	0.000
22	HT l	8x6x7/16	543	120								
	r	8x6x7/16	544	120								
22	HB	6x6x3/8	572	240	1.000	1.879	0.579	0.468	0.111	0.317	0.244	0.073
22	D b	31/2x21/2x5/16	743	146			fa>Fe			0.761		
	t	31/2x21/2x5/16	744	146			fa>Fe			0.799		
22	BV	3x2x1/4	622	85								
22	BD	3x2x1/4	647	146								
23	V	6x31/2x5/16	598	167	1.716	1.378	1.375	1.375	0.000	0.717	0.717	0.000
23	HT l	8x6x7/16	545	120								
	r	8x6x7/16	546	120								
23	HB	6x6x3/8	573	240								
23	D b	5x3x5/16	745	145	1.000	1.091	1.477	1.355	0.122	0.787	0.707	0.081
	t	5x3x5/16	746	145	1.000	1.091	1.509	1.384	0.125	0.805	0.722	0.083
23	BV	3x2x1/4	623	83								
23	BD	3x2x1/4	648	145								
24	V	6x31/2x5/16	599	163	1.502	1.378	0.966	0.966	0.000	0.504	0.504	0.000
24	HT l	8x6x7/16	547	120								
	r	8x6x7/16	548	120								
24	HB	6x6x3/8	574	240								
24	D b	5x31/2x5/16	747	144	1.000	1.328	0.827	0.759	0.069	0.443	0.397	0.046
	t	5x31/2x5/16	748	144	1.000	1.328	0.857	0.787	0.070	0.458	0.412	0.046
24	BV	3x2x1/4	624	82								
24	BD	3x2x1/4	649	144								
End	EV	18-I-85	600	160								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			NO FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length (in)	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South	7S	18-I-85	820	289	1.000	7.723	0.984	0.085	0.899	0.641	0.048	0.593
		18-I-85	823	95	1.000	7.723	0.877	0.023	0.853	0.576	0.014	0.563
North End	1N	18-I-47	835	78	1.000	7.262	0.529	0.013	0.516	0.348	0.008	0.341
		18-I-47	836	78								
		18-I-47	837	78								
		18-I-47	838	78	1.000	7.262	0.523	0.013	0.510	0.344	0.008	0.337
	2N	24-I-74	859	78	1.000	9.542	1.362	0.013	1.349	0.898	0.008	0.890
		24-I-74	860	78	1.000	9.542	0.746	0.029	0.717	0.490	0.017	0.473
		24-I-74	861	78	1.000	9.542	0.608	0.013	0.595	0.400	0.008	0.393
		24-I-74	862	78	1.000	9.542	1.273	0.029	1.244	0.838	0.017	0.821
	3N	18-I-70	868	161								
	4N	18-I-70	867	181	1.000	7.485	1.545	0.121	1.424	1.009	0.070	0.940
	5N	18-I-85	873	43								
	6N	18-I-85	872	109	1.000	2.611	0.910	0.090	0.820	0.592	0.050	0.541
		18-I-85	874	52	1.000	2.611	0.782	0.001	0.781	0.516	0.001	0.515
	7N	18-I-85	871	181	1.000	7.723	1.374	0.112	1.261	0.897	0.065	0.832
Knee Braces	K1	8x8x1/2	998	186	1.000	2.505	0.688	0.193	0.495	0.430	0.104	0.327
	K2	8x8x1/2	999	186	1.000	2.505	0.751	0.288	0.463	0.460	0.155	0.306
		Total Overstressed Members					36			1		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.9. Hangars 43 and 47 Truss T2 with Knee Braces, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
1	V t	18-I-64	76	118						
	b	18-I-64	50	42						
1	HT l	8x6x9/16	1	120						
	r	8x6x9/16	2	120						
1	HB	6x6x9/16	51	240						
1	D t	6x4x3/8	201	134						
	b	6x4x3/8	202	134						
1	BV	3x2.5x1/4	101	61						
1	BD	3x2.5x1/4	126	135						
2	V	3x2x1/4	77	163						
2	HT l	8x6x9/16	3	120						
	r	8x6x9/16	4	120						
2	HB	6x6x9/16	52	240						
2	D t	6x31/2x5/16	203	145						
	b	6x31/2x5/16	204	145						
2	BV	3x2.5x1/4	102	83						
2	BD	3x2x1/4	127	147						
3	V	6x4x3/8	78	167						
3	HT l	8x6x9/16	5	120						
	r	8x6x9/16	6	120						
3	HB	6x6x9/16	53	240						
3	D t	5x3x5/16	205	146						
	b	5x3x5/16	206	146						
3	BV	3x2.5x1/4	103	85						
3	BD	3x2x1/4	128	148						
4	V	6x31/2x5/16	79	170						
4	HT l	8x6x9/16	7	120						
	r	8x6x9/16	8	120						
4	HB	6x6x9/16	54	240						
4	D t	31/2x21/2x5/16	207	147						
	b	31/2x21/2x5/16	208	147						
4	BV	3x2.5x1/4	104	87						
4	BD	3x2x1/4	129	149						
5	V	6x31/2x5/16	80	173						
5	HT l	8x6x5/8	9	120						
	r	8x6x5/8	10	120						
5	HB	6x6x11/16	55	240						
5	D t	3x21/2x5/16	209	148						
	b	3x21/2x5/16	210	148						
5	BV	3x2.5x1/4	105	88						
5	BD	3x2x1/4	130	150						
6	V	6x31/2x5/16	81	177						
6	HT l	8x6x5/8	11	120						
	r	8x6x5/8	12	120						
6	HB	6x6x11/16	56	240						
6	D t	4x3x5/16	211	149						
	b	4x3x5/16	212	149						
6	BV	3x2.5x1/4	106	90						
6	BD	3x2x1/4	131	151						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
7	V	6x31/2x5/16	82	180						
7	HT l	8x6x5/8	13	120						
	r	8x6x5/8	14	120						
7	HB	6x6x11/16	57	240						
7	D b	3x2x5/16	213	151						
	t	3x2x5/16	214	151						
7	BV	3x2.5x1/4	107	90						
7	BD	3x2x1/4	132	149						
8	V	6x31/2x5/16	83	183						
8	HT l	8x6x5/8	15	120						
	r	8x6x5/8	16	120						
8	HB	6x6x11/16	58	240						
8	D b	3x21/2x5/16	215	152						
	t	3x21/2x5/16	216	152						
8	BV	3x2.5x1/4	108	92						
8	BD	3x2x1/4	133	150						
9	V	6x31/2x5/16	84	187						
9	HT l	8x6x9/16	17	120						
	r	8x6x9/16	18	120						
9	HB	6x6x9/16	59	240						
9	D b	31/2x21/2x5/16	217	153						
	t	31/2x21/2x5/16	218	153						
9	BV	3x2.5x1/4	109	93						
9	BD	3x2x1/4	134	151						
10	V	6x4x3/8	85	190						
10	HT l	8x6x9/16	19	120						
	r	8x6x9/16	20	120						
10	HB	6x6x9/16	60	240						
10	D b	4x3x5/16	219	154						
	t	4x3x5/16	220	154						
10	BV	3x2.5x1/4	110	95						
10	BD	3x2x1/4	135	152						
11	V	6x4x3/8	86	193						
11	HT l	8x6x9/16	21	120						
	r	8x6x9/16	22	120						
11	HB	6x6x9/16	61	240						
11	D b	6x31/2x6/16	221	155						
	t	6x31/2x6/16	222	155						
11	BV	3x2.5x1/4	111	97						
11	BD	3x2x1/4	136	153						
12	V	6x4x7/16	87	197						
12	HT l	8x6x9/16	23	120						
	r	8x6x9/16	24	120						
12	HB	6x6x9/16	62	240						
12	D b	6x31/2x3/8	223	156						
	t	6x31/2x3/8	224	156						
12	BV	3x2.5x1/4	112	98						
12	BD	3x2x1/4	137	154						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
13	V	14-I-87	88	200						
13	HT l	8x6x9/16	25	120						
	r	8x6x9/16	26	120						
13	HB	6x6x9/16	63	240						
13	D t	6x31/2x3/8	225	156						
	b	6x31/2x3/8	226	156						
13	BV	3x2.5x1/4	113	98						
13	BD	3x2x1/4	138	154						
14	V	6x4x7/16	89	197						
14	HT l	8x6x9/16	27	120						
	r	8x6x9/16	28	120						
14	HB	6x6x9/16	64	240						
14	D t	6x31/2x6/16	227	155						
	b	6x31/2x6/16	228	155						
14	BV	3x2x1/4	114	97						
14	BD	3x2x1/4	139	153						
15	V	6x4x3/8	90	193						
15	HT l	8x6x9/16	29	120						
	r	8x6x9/16	30	120						
15	HB	6x6x9/16	65	240						
15	D t	4x3x5/16	229	154						
	b	4x3x5/16	230	154						
15	BV	3x2.5x1/4	115	95						
15	BD	3x2x1/4	140	152						
16	V	6x4x3/8	91	190						
16	HT l	8x6x9/16	31	120						
	r	8x6x9/16	32	120						
16	HB	6x6x9/16	66	240						
16	D t	31/2x21/2x5/16	231	153						
	b	31/2x21/2x5/16	232	153						
16	BV	3x2.5x1/4	116	93						
16	BD	3x2x1/4	141	151						
17	V	6x31/2x5/16	92	187						
17	HT l	8x6x5/8	33	120						
	r	8x6x5/8	34	120						
17	HB	6x6x11/16	67	240						
17	D t	3x21/2x5/16	233	152						
	b	3x21/2x5/16	234	152						
17	BV	3x2x1/4	117	92						
17	BD	3x2x1/4	142	150						
18	V	6x31/2x5/16	93	183						
18	HT l	8x6x5/8	35	120						
	r	8x6x5/8	36	120						
18	HB	6x6x11/16	68	240						
18	D t	3x2x5/16	235	151						
	b	3x2x5/16	236	151						
18	BV	3x2.5x1/4	118	90						
18	BD	3x2x1/4	143	149						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
19	V	6x31/2x5/16	94	180						
19	HT l	8x6x5/8	37	120						
	r	8x6x5/8	38	120						
19	HB	6x6x11/16	69	240						
19	D b	4x3x5/16	237	149						
	t	4x3x5/16	238	149						
19	BV	3x2x1/4	119	90						
19	BD	3x2x1/4	144	149						
20	V	6x31/2x5/16	95	177						
20	HT l	8x6x5/8	39	120						
	r	8x6x5/8	40	120						
20	HB	6x6x11/16	70	240						
20	D b	3x21/2x5/16	239	148						
	t	3x21/2x5/16	240	148						
20	BV	3x2.5x1/4	120	88						
20	BD	3x2x1/4	145	148						
21	V	6x31/2x5/16	96	173						
21	HT l	8x6x9/16	41	120						
	r	8x6x9/16	42	120						
21	HB	6x6x9/16	71	240						
21	D b	31/2x21/2x5/16	241	147						
	t	31/2x21/2x5/16	242	147						
21	BV	3x2.5x1/4	121	87						
21	BD	3x2x1/4	146	147						
22	V	6x31/2x5/16	97	170						
22	HT l	8x6x9/16	43	120						
	r	8x6x9/16	44	120						
22	HB	6x6x9/16	72	240						
22	D b	5x3x5/16	243	146						
	t	5x3x5/16	244	146						
22	BV	3x2.5x1/4	122	85						
22	BD	3x2x1/4	147	146						
23	V	6x4x3/8	98	167						
23	HT l	8x6x9/16	45	120						
	r	8x6x9/16	46	120						
23	HB	6x6x9/16	73	240						
23	D b	6x31/2x5/16	245	145						
	t	6x31/2x5/16	246	145						
23	BV	3x2.5x1/4	123	83						
23	BD	3x2x1/4	148	145						
24	V	6x4x3/8	99	163						
24	HT l	8x6x9/16	47	120						
	r	8x6x9/16	48	120						
24	HB	6x6x9/16	74	240						
24	D b	6x4x3/8	247	144						
	t	6x4x3/8	248	144						
24	BV	3x2.5x1/4	124	82						
24	BD	3x2x1/4	149	144						
End	EV t	18-I-64	100	118						
	b	18-I-64	49	42						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
South End	1S	8-I-17	301	78						
	2S	12-I-23	302	312						
	3S	10-I-21	303	78						
	4S	14-I-30	304	312						
	5S	14-I-30	305	78						
		14-I-30	306	78						
		14-I-30	307	78						
		14-I-30	308	78						
	6S	10-I-21	313	78						
	7S	18-I-47	309	78						
		18-I-47	310	78						
		18-I-47	311	78						
		18-I-47	312	78						
	8S	8-H-31	314	181						
	9S	8-H-31	315	217						
	10S	8-H-31	316	42						
	11S	18-I-47	317	181						
	12S	18-I-47	318	161						
	13S	18-I-47	331	43						
	14S	18-I-47	319	42						
	15S	18-I-64	320	181						
	16S	18-I-64	321	119						
		18-I-64	323	42						
	17S	18-I-64	322	43						
	18S	18-I-64	50	42						
	19S	31/2x21/2x5/16	323	175						
		31/2x21/2x5/16	324	175						
	20S	31/2x21/2x5/16	325	175						
		31/2x21/2x5/16	326	175						
	21S	31/2x21/2x5/16	327	180						
		31/2x21/2x5/16	328	180						
	22S	31/2x21/2x5/16	329	180						
		31/2x21/2x5/16	330	180						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
North End	1N	8-I-17	352	78						
	2N	12-I-23	351	312						
	3N	10-I-21	354	78						
	4N	14-I-30	353	312						
	5N	14-I-30	355	78						
		14-I-30	356	78						
		14-I-30	357	78						
		14-I-30	358	78						
	6N	10-I-21	363	78						
	7N	18-I-47	359	78						
		18-I-47	360	78						
		18-I-47	361	78						
		18-I-47	362	78						
	8N	8-H-31	364	181						
	9N	8-H-31	365	217						
	10N	8-H-31	366	42						
	11N	18-I-47	367	181						
	12N	18-I-47	368	161						
	13N	18-I-47	369	43						
	14N	18-I-47	370	42						
	15N	18-I-64	371	181						
	16N	18-I-64	372	161						
		18-I-64	374	42						
	17N	18-I-64	373	43						
	18N	18-I-64	49	42						
	19N	31/2x21/2x5/16	374	175						
		31/2x21/2x5/16	375	175						
	20N	31/2x21/2x5/16	376	175						
		31/2x21/2x5/16	377	175						
	21N	31/2x21/2x5/16	378	180						
		31/2x21/2x5/16	379	180						
	22N	31/2x21/2x5/16	380	180						
		31/2x21/2x5/16	381	180						
Center Column	CC	14-I-87	385	384						
Knee	K1	8x8x1/2	998	186						
Braces	K2	8x8x1/2	999	186						
Total Overstressed Members					0			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.10. Hangars 43 and 47 Truss T2 with Knee Braces, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
1	V t	18-I-64	76	118								
	b	18-I-64	50	42								
1	HT l	8x6x9/16	1	120								
	r	8x6x9/16	2	120								
1	HB	6x6x9/16	51	240								
1	D t	6x4x3/8	201	134								
	b	6x4x3/8	202	134								
1	BV	3x2.5x1/4	101	61								
1	BD	3x2x1/4	126	135								
2	V	6x4x3/8	77	163								
2	HT l	8x6x9/16	3	120								
	r	8x6x9/16	4	120								
2	HB	6x6x9/16	52	240								
2	D t	6x31/2x5/16	203	145	1.000	1.380	0.536	0.438	0.097	0.294	0.230	0.064
	b	6x31/2x5/16	204	145	1.000	1.380	0.525	0.428	0.097	0.288	0.224	0.064
2	BV	3x2.5x1/4	102	83								
2	BD	3x2x1/4	127	147								
3	V	6x4x3/8	78	167								
3	HT l	8x6x9/16	5	120								
	r	8x6x9/16	6	120								
3	HB	6x6x9/16	53	240								
3	D t	5x3x5/16	205	146	1.000	1.084	0.683	0.578	0.105	0.371	0.302	0.069
	b	5x3x5/16	206	146	1.000	1.084	0.661	0.557	0.104	0.359	0.291	0.069
3	BV	3x2.5x1/4	103	85								
3	BD	3x2x1/4	128	148								
4	V	6x31/2x5/16	79	170								
4	HT l	8x6x9/16	7	120								
	r	8x6x9/16	8	120								
4	HB	6x6x9/16	54	240								
4	D t	31/2x21/2x5/16	207	147								
	b	31/2x21/2x5/16	208	147								
4	BV	3x2.5x1/4	104	87								
4	BD	3x2x1/4	129	149								
5	V	6x31/2x5/16	80	173								
5	HT l	8x6x5/8	9	120								
	r	8x6x5/8	10	120								
5	HB	6x6x11/16	55	240								
5	D t	3x21/2x5/16	209	148								
	b	3x21/2x5/16	210	148								
5	BV	3x2.5x1/4	105	88								
5	BD	3x2x1/4	130	150								
6	V	6x31/2x5/16	81	177								
6	HT l	8x6x5/8	11	120								
	r	8x6x5/8	12	120								
6	HB	6x6x11/16	56	240								
6	D t	4x3x5/16	211	149								
	b	4x3x5/16	212	149								
6	BV	3x2.5x1/4	106	90								
6	BD	3x2x1/4	131	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
Bay	Mem.	Section	#	Length	K	r						
7	V	6x31/2x5/16	82	180								
7	HT l	8x6x5/8	13	120								
	r	8x6x5/8	14	120								
7	HB	6x6x11/16	57	240								
7	D b	3x2x5/16	213	151	1.000	0.767	0.935	0.803	0.132	0.506	0.419	0.087
	t	3x2x5/16	214	151	1.000	0.767	1.049	0.897	0.152	0.568	0.468	0.100
7	BV	3x2.5x1/4	107	90								
7	BD	3x2x1/4	132	149								
8	V	6x31/2x5/16	83	183								
8	HT l	8x6x5/8	15	120								
	r	8x6x5/8	16	120								
8	HB	6x6x11/16	58	240								
8	D b	3x21/2x5/16	215	152			fa>Fe			0.430		
	t	3x21/2x5/16	216	152			fa>Fe			0.438		
8	BV	3x2.5x1/4	108	92								
8	BD	3x2x1/4	133	150								
9	V	6x31/2x5/16	84	187								
9	HT l	8x6x9/16	17	120								
	r	8x6x9/16	18	120								
9	HB	6x6x9/16	59	240								
9	D b	31/2x21/2x5/16	217	153	1.000	0.966	1.344	1.009	0.335	0.748	0.526	0.221
	t	31/2x21/2x5/16	218	153	1.000	0.966	1.375	1.024	0.352	0.767	0.534	0.232
9	BV	3x2.5x1/4	109	93								
9	BD	3x2x1/4	134	151								
10	V	6x4x3/8	85	190								
10	HT l	8x6x9/16	19	120								
	r	8x6x9/16	20	120								
10	HB	6x6x9/16	60	240								
10	D b	4x3x5/16	219	154	1.000	1.168	1.060	0.828	0.232	0.585	0.432	0.153
	t	4x3x5/16	220	154	1.000	1.168	1.073	0.836	0.237	0.593	0.436	0.156
10	BV	3x2.5x1/4	110	95								
10	BD	3x2x1/4	135	152								
11	V	6x4x3/8	86	193								
11	HT l	8x6x9/16	21	120								
	r	8x6x9/16	22	120								
11	HB	6x6x9/16	61	240								
11	D b	6x31/2x6/16	221	155	1.000	1.380	0.732	0.617	0.115	0.399	0.323	0.076
	t	6x31/2x6/16	222	155	1.000	1.380	0.740	0.625	0.115	0.403	0.327	0.076
11	BV	3x2.5x1/4	111	97								
11	BD	3x2x1/4	136	153								
12	V	6x4x7/16	87	197								
12	HT l	8x6x9/16	23	120								
	r	8x6x9/16	24	120								
12	HB	6x6x9/16	62	240								
12	D b	6x31/2x3/8	223	156	1.000	1.390	0.778	0.664	0.114	0.422	0.347	0.075
	t	6x31/2x3/8	224	156	1.000	1.390	0.797	0.682	0.115	0.433	0.357	0.076
12	BV	3x21/2x1/4	112	98								
12	BD	3x2x1/4	137	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
13	V	14-I-87	88	200								
13	HT l	8x6x9/16	25	120								
	r	8x6x9/16	26	120								
13	HB	6x6x9/16	63	240								
13	D t	6x31/2x3/8	225	156	1.000	1.390	0.797	0.682	0.115	0.433	0.357	0.076
	b	6x31/2x3/8	226	156	1.000	1.390	0.778	0.664	0.114	0.422	0.347	0.075
13	BV	3x21/2x1/4	113	98								
13	BD	3x2x1/4	138	154								
14	V	6x4x7/16	89	197								
14	HT l	8x6x9/16	27	120								
	r	8x6x9/16	28	120								
14	HB	6x6x9/16	64	240								
14	D t	6x31/2x6/16	227	155	1.000	1.380	0.740	0.625	0.115	0.403	0.327	0.076
	b	6x31/2x6/16	228	155	1.000	1.380	0.732	0.617	0.115	0.399	0.323	0.076
14	BV	3x2.5x1/4	114	97								
14	BD	3x2x1/4	139	153								
15	V	6x4x3/8	90	193								
15	HT l	8x6x9/16	29	120								
	r	8x6x9/16	30	120								
15	HB	6x6x9/16	65	240								
15	D t	4x3x5/16	229	154	1.000	1.168	1.073	0.836	0.237	0.593	0.436	0.156
	b	4x3x5/16	230	154	1.000	1.168	1.060	0.828	0.232	0.585	0.432	0.153
15	BV	3x2.5x1/4	115	95								
15	BD	3x2x1/4	140	152								
16	V	6x4x3/8	91	190								
16	HT l	8x6x9/16	31	120								
	r	8x6x9/16	32	120								
16	HB	6x6x9/16	66	240								
16	D t	31/2x21/2x5/16	231	153	1.000	0.966	1.375	1.024	0.352	0.767	0.534	0.232
	b	31/2x21/2x5/16	232	153	1.000	0.966	1.344	1.009	0.335	0.748	0.526	0.221
16	BV	3x2.5x1/4	116	93								
16	BD	3x2x1/4	141	151								
17	V	6x31/2x5/16	92	187								
17	HT l	8x6x5/8	33	120								
	r	8x6x5/8	34	120								
17	HB	6x6x11/16	67	240								
17	D t	3x21/2x5/16	233	152			fa>Fe			0.438		
	b	3x21/2x5/16	234	152			fa>Fe			0.430		
17	BV	3x2.5x1/4	117	92								
17	BD	3x2x1/4	142	150								
18	V	6x31/2x5/16	93	183								
18	HT l	8x6x5/8	35	120								
	r	8x6x5/8	36	120								
18	HB	6x6x11/16	68	240								
18	D t	3x2x5/16	235	151	1.000	0.767	1.049	0.897	0.152	0.568	0.468	0.100
	b	3x2x5/16	236	151	1.000	0.767	0.935	0.803	0.132	0.506	0.419	0.087
18	BV	3x2.5x1/4	118	90								
18	BD	3x2x1/4	143	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	94	180								
19	HT l	8x6x5/8	37	120								
	r	8x6x5/8	38	120								
19	HB	6x6x11/16	69	240								
19	D b	4x3x5/16	237	149								
	t	4x3x5/16	238	149								
19	BV	3x2.5x1/4	119	90								
19	BD	3x2x1/4	144	149								
20	V	6x31/2x5/16	95	177								
20	HT l	8x6x5/8	39	120								
	r	8x6x5/8	40	120								
20	HB	6x6x11/16	70	240								
20	D b	3x21/2x5/16	239	148								
	t	3x21/2x5/16	240	148								
20	BV	3x2.5x1/4	120	88								
20	BD	3x2x1/4	145	148								
21	V	6x31/2x5/16	96	173								
21	HT l	8x6x9/16	41	120								
	r	8x6x9/16	42	120								
21	HB	6x6x9/16	71	240								
21	D b	31/2x21/2x5/16	241	147								
	t	31/2x21/2x5/16	242	147								
21	BV	3x2.5x1/4	121	87								
21	BD	3x2x1/4	146	147								
22	V	6x31/2x5/16	97	170								
22	HT l	8x6x9/16	43	120								
	r	8x6x9/16	44	120								
22	HB	6x6x9/16	72	240								
22	D b	5x3x5/16	243	146	1.000	1.084	0.661	0.557	0.104	0.359	0.291	0.069
	t	5x3x5/16	244	146	1.000	1.084	0.683	0.578	0.105	0.371	0.302	0.069
22	BV	3x2.5x1/4	122	85								
22	BD	3x2x1/4	147	146								
23	V	6x4x3/8	98	167								
23	HT l	8x6x9/16	45	120								
	r	8x6x9/16	46	120								
23	HB	6x6x9/16	73	240								
23	D b	6x31/2x5/16	245	145	1.000	1.380	0.525	0.428	0.097	0.288	0.224	0.064
	t	6x31/2x5/16	246	145	1.000	1.380	0.536	0.438	0.097	0.294	0.230	0.064
23	BV	3x2.5x1/4	123	83								
23	BD	3x2x1/4	148	145								
24	V	6x4x3/8	99	163								
24	HT l	8x6x9/16	47	120								
	r	8x6x9/16	48	120								
24	HB	6x6x9/16	74	240								
24	D b	6x4x3/8	247	144								
	t	6x4x3/8	248	144								
24	BV	3x2.5x1/4	124	82								
24	BD	3x2x1/4	149	144								
End	EV t	18-I-64	100	118								
	b	18-I-64	49	42								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South	1S	8-I-17	301	78								
End	2S	12-I-23	302	312	1.000	0.848	1.101	0.802	0.299	0.616	0.418	0.197
	3S	10-I-21	303	78								
	4S	14-I-30	304	312	1.000	1.488	0.529	0.148	0.381	0.329	0.077	0.251
	5S	14-I-30	305	78								
		14-I-30	306	78								
		14-I-30	307	78								
		14-I-30	308	78								
	6S	10-I-21	313	78								
	7S	18-I-47	309	78								
		18-I-47	310	78								
		18-I-47	311	78								
		18-I-47	312	78								
	8S	8-H-31	314	181								
	9S	8-H-31	315	217								
	10S	8-H-31	316	42								
	11S	18-I-47	317	181								
	12S	18-I-47	318	161								
	13S	18-I-47	331	43								
	14S	18-I-47	319	42								
	15S	18-I-64	320	181								
	16S	18-I-64	321	119								
		18-I-64	323	42								
	17S	18-I-64	322	43								
	18S	18-I-64	50	42								
	19S	31/2x21/2x5/16	323	175								
		31/2x21/2x5/16	324	175								
	20S	31/2x21/2x5/16	325	175								
		31/2x21/2x5/16	326	175								
	21S	31/2x21/2x5/16	327	180	1.000	0.966	0.808	0.681	0.128	0.440	0.355	0.084
		31/2x21/2x5/16	328	180	1.000	0.966	0.898	0.706	0.120	0.448	0.368	0.079
	22S	31/2x21/2x5/16	329	180	1.000	0.966	0.606	0.469	0.138	0.336	0.245	0.091
		31/2x21/2x5/16	330	180	1.000	0.966	0.553	0.444	0.109	0.304	0.232	0.072

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
North End	1N	8-I-17	352	78								
	2N	12-I-23	351	312	1.000	0.848	1.101	0.802	0.299	0.616	0.418	0.197
	3N	10-I-21	354	78								
	4N	14-I-30	353	312	1.000	1.488	0.529	0.148	0.381	0.329	0.077	0.251
	5N	14-I-30	355	78								
		14-I-30	356	78								
		14-I-30	357	78								
		14-I-30	358	78								
	6N	10-I-21	363	78								
	7N	18-I-47	359	78								
		18-I-47	360	78								
		18-I-47	361	78								
		18-I-47	362	78								
	8N	8-H-31	364	181								
	9N	8-H-31	365	217								
	10N	8-H-31	366	42								
	11N	18-I-47	367	181								
	12N	18-I-47	368	161								
	13N	18-I-47	369	43								
	14N	18-I-47	370	42								
	15N	18-I-64	371	181								
	16N	18-I-64	372	119								
		18-I-64	374	42								
	17N	18-I-64	373	43								
	18N	18-I-64	49	42								
	19N	31/2x21/2x5/16	374	175	1.000	0.966	0.661	0.430	0.181	0.344	0.224	0.119
		31/2x21/2x5/16	375	175	1.000	0.966	0.546	0.455	0.092	0.298	0.237	0.061
	20N	31/2x21/2x5/16	376	175								
		31/2x21/2x5/16	377	175								
	21N	31/2x21/2x5/16	378	180	1.000	0.966	1.177	0.912	0.266	0.651	0.476	0.176
		31/2x21/2x5/16	379	180	1.000	0.966	1.252	0.936	0.316	0.697	0.488	0.209
	22N	31/2x21/2x5/16	380	180								
		31/2x21/2x5/16	381	180								
Center Column	CC	14-I-87	385	384								
Knee	K1	8x8x1/2	998	186								
Braces	K2	8x8x1/2	999	186								
Total Overstressed Members							18			0		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

All Sections are Double Angles Unless Otherwise Noted

Table 9.11. Hangars 44 and 45 Truss T2 with Knee Braces, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
1	V t	18-I-64	76	118						
	b	18-I-64	50	42						
1	HT l	8x6x9/16	1	120						
	r	8x6x9/16	2	120						
1	HB	6x6x9/16	51	240						
1	D t	6x4x3/8	201	134						
	b	6x4x3/8	202	134						
1	BV	3x2.5x1/4	101	61						
1	BD	3x2x1/4	126	135						
2	V	6x4x3/8	77	163						
2	HT l	8x6x9/16	3	120						
	r	8x6x9/16	4	120						
2	HB	6x6x9/16	52	240						
2	D t	6x31/2x5/16	203	145						
	b	6x31/2x5/16	204	145						
2	BV	3x2.5x1/4	102	83						
2	BD	3x2x1/4	127	147						
3	V	6x4x3/8	78	167						
3	HT l	8x6x9/16	5	120						
	r	8x6x9/16	6	120						
3	HB	6x6x9/16	53	240						
3	D t	5x3x5/16	205	146						
	b	5x3x5/16	206	146						
3	BV	3x2.5x1/4	103	85						
3	BD	3x2x1/4	128	148						
4	V	6x31/2x5/16	79	170						
4	HT l	8x6x9/16	7	120						
	r	8x6x9/16	8	120						
4	HB	6x6x9/16	54	240						
4	D t	31/2x21/2x5/16	207	147						
	b	31/2x21/2x5/16	208	147						
4	BV	3x2.5x1/4	104	87						
4	BD	3x2x1/4	129	149						
5	V	6x31/2x5/16	80	173						
5	HT l	8x6x5/8	9	120						
	r	8x6x5/8	10	120						
5	HB	6x6x11/16	55	240						
5	D t	3x21/2x5/16	209	148						
	b	3x21/2x5/16	210	148						
5	BV	3x2.5x1/4	105	88						
5	BD	3x2x1/4	130	150						
6	V	6x31/2x5/16	81	177						
6	HT l	8x6x5/8	11	120						
	r	8x6x5/8	12	120						
6	HB	6x6x11/16	56	240						
6	D t	4x3x5/16	211	149						
	b	4x3x5/16	212	149						
6	BV	3x2.5x1/4	106	90						
6	BD	3x2x1/4	131	151						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length		AXL	B33		AXL	B33
7	V	6x31/2x5/16	82	180						
7	HT l	8x6x5/8	13	120						
	r	8x6x5/8	14	120						
7	HB	6x6x11/16	57	240						
7	D b	3x2x5/16	213	151						
	t	3x2x5/16	214	151						
7	BV	3x2.5x1/4	107	90						
7	BD	3x2x1/4	132	149						
8	V	6x31/2x5/16	83	183						
8	HT l	8x6x5/8	15	120						
	r	8x6x5/8	16	120						
8	HB	6x6x11/16	58	240						
8	D b	3x21/2x5/16	215	152						
	t	3x21/2x5/16	216	152						
8	BV	3x2.5x1/4	108	92						
8	BD	3x2x1/4	133	150						
9	V	6x31/2x5/16	84	187						
9	HT l	8x6x9/16	17	120						
	r	8x6x9/16	18	120						
9	HB	6x6x9/16	59	240						
9	D b	31/2x21/2x5/16	217	153						
	t	31/2x21/2x5/16	218	153						
9	BV	3x2.5x1/4	109	93						
9	BD	3x2x1/4	134	151						
10	V	6x4x3/8	85	190						
10	HT l	8x6x9/16	19	120						
	r	8x6x9/16	20	120						
10	HB	6x6x9/16	60	240						
10	D b	4x3x5/16	219	154						
	t	4x3x5/16	220	154						
10	BV	3x2.5x1/4	110	95						
10	BD	3x2x1/4	135	152						
11	V	6x4x3/8	86	193						
11	HT l	8x6x9/16	21	120						
	r	8x6x9/16	22	120						
11	HB	6x6x9/16	61	240						
11	D b	6x31/2x6/16	221	155						
	t	6x31/2x6/16	222	155						
11	BV	3x2.5x1/4	111	97						
11	BD	3x2x1/4	136	153						
12	V	6x4x7/16	87	197						
12	HT l	8x6x9/16	23	120						
	r	8x6x9/16	24	120						
12	HB	6x6x9/16	62	240						
12	D b	6x31/2x3/8	223	156						
	t	6x31/2x3/8	224	156						
12	BV	3x21/2x1/4	112	98						
12	BD	3x2x1/4	137	154						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
13	V	14-I-87	88	200						
13	HT l	8x6x9/16	25	120						
	r	8x6x9/16	26	120						
13	HB	6x6x9/16	63	240						
13	D t	6x31/2x3/8	225	156						
	b	6x31/2x3/8	226	156						
13	BV	3x21/2x1/4	113	98						
13	BD	3x2x1/4	138	154						
14	V	6x4x7/16	89	197						
14	HT l	8x6x9/16	27	120						
	r	8x6x9/16	28	120						
14	HB	6x6x9/16	64	240						
14	D t	6x31/2x6/16	227	155						
	b	6x31/2x6/16	228	155						
14	BV	3x2.5x1/4	114	97						
14	BD	3x2x1/4	139	153						
15	V	6x4x3/8	90	193						
15	HT l	8x6x9/16	29	120						
	r	8x6x9/16	30	120						
15	HB	6x6x9/16	65	240						
15	D t	4x3x5/16	229	154						
	b	4x3x5/16	230	154						
15	BV	3x2.5x1/4	115	95						
15	BD	3x2x1/4	140	152						
16	V	6x4x3/8	91	190						
16	HT l	8x6x9/16	31	120						
	r	8x6x9/16	32	120						
16	HB	6x6x9/16	66	240						
16	D t	31/2x21/2x5/16	231	153						
	b	31/2x21/2x5/16	232	153						
16	BV	3x2.5x1/4	116	93						
16	BD	3x2x1/4	141	151						
17	V	6x31/2x5/16	92	187						
17	HT l	8x6x5/8	33	120						
	r	8x6x5/8	34	120						
17	HB	6x6x11/16	67	240						
17	D t	3x21/2x5/16	233	152						
	b	3x21/2x5/16	234	152						
17	BV	3x2.5x1/4	117	92						
17	BD	3x2x1/4	142	150						
18	V	6x31/2x5/16	93	183						
18	HT l	8x6x5/8	35	120						
	r	8x6x5/8	36	120						
18	HB	6x6x11/16	68	240						
18	D t	3x2x5/16	235	151						
	b	3x2x5/16	236	151						
18	BV	3x2.5x1/4	118	90						
18	BD	3x2x1/4	143	149						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B33	Ratio	AXL	B33
19	V	6x31/2x5/16	94	180						
19	HT l	8x6x5/8	37	120						
	r	8x6x5/8	38	120						
19	HB	6x6x11/16	69	240						
19	D b	4x3x5/16	237	149						
	t	4x3x5/16	238	149						
19	BV	3x2.5x1/4	119	90						
19	BD	3x2x1/4	144	149						
20	V	6x31/2x5/16	95	177						
20	HT l	8x6x5/8	39	120						
	r	8x6x5/8	40	120						
20	HB	6x6x11/16	70	240						
20	D b	3x21/2x5/16	239	148						
	t	3x21/2x5/16	240	148						
20	BV	3x2.5x1/4	120	88						
20	BD	3x2x1/4	145	148						
21	V	6x31/2x5/16	96	173						
21	HT l	8x6x9/16	41	120						
	r	8x6x9/16	42	120						
21	HB	6x6x9/16	71	240						
21	D b	31/2x21/2x5/16	241	147						
	t	31/2x21/2x5/16	242	147						
21	BV	3x2.5x1/4	121	87						
21	BD	3x2x1/4	146	147						
22	V	6x31/2x5/16	97	170						
22	HT l	8x6x9/16	43	120						
	r	8x6x9/16	44	120						
22	HB	6x6x9/16	72	240						
22	D b	5x3x5/16	243	146						
	t	5x3x5/16	244	146						
22	BV	3x2.5x1/4	122	85						
22	BD	3x2x1/4	147	146						
23	V	6x4x3/8	98	167						
23	HT l	8x6x9/16	45	120						
	r	8x6x9/16	46	120						
23	HB	6x6x9/16	73	240						
23	D b	6x31/2x5/16	245	145						
	t	6x31/2x5/16	246	145						
23	BV	3x2.5x1/4	123	83						
23	BD	3x2x1/4	148	145						
24	V	6x4x3/8	99	163						
24	HT l	8x6x9/16	47	120						
	r	8x6x9/16	48	120						
24	HB	6x6x9/16	74	240						
24	D b	6x4x3/8	247	144						
	t	6x4x3/8	248	144						
24	BV	3x2.5x1/4	124	82						
24	BD	3x2x1/4	149	144						
End	EV t	18-I-64	100	118						
	b	18-I-64	49	42						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed Stress Ratio	Computed AXL	Computed B33	No FOS * Stress Ratio	No FOS * AXL	No FOS * B33
South End	1S	8-H-31	310	171						
		8-H-31	311	213						
		8-H-31	316	43						
	2S	18-I-47	312	132						
		18-I-47	314	39						
		18-I-47	315	83						
		18-I-47	317	130						
		18-I-47	319	43						
	3S	18-I-64	318	132						
		18-I-64	320	122						
		18-I-64	321	95						
		18-I-64	340	35						
	4S	8-I-17	301	78						
		14-I-30	302	312						
	5S	10-I-21	303	78						
		14-I-30	304	312						
	6S	2 C's 12x40	305	312						
	7S	10-I-21	306	78						
	8S	2 C's 12x40	307	312						
	10S	3.5x2.5x5/16	324	169						
		3.5x2.5x5/16	325	169						
	11S	3.5x2.5x5/16	322	169						
		3.5x2.5x5/16	323	169						
	12S	3.5x2.5x5/16	328	169						
		3.5x2.5x5/16	329	169						
	13S	3.5x2.5x5/16	326	169						
		3.5x2.5x5/16	327	169						
	14S	3.5x2.5x5/16	332	169						
		3.5x2.5x5/16	333	169						
	15S	3.5x2.5x5/16	330	169						
		3.5x2.5x5/16	331	169						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	Computed			No FOS *		
					Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
North End	1N	8-I-17	352	78						
	2N	12-I-23	351	312						
	3N	10-I-21	354	78						
	4N	14-I-30	353	312						
	5N	14-I-30	355	78						
		14-I-30	356	78						
		14-I-30	357	78						
		14-I-30	358	78						
	6N	10-I-21	363	78						
	7N	18-I-47	359	78						
		18-I-47	360	78						
		18-I-47	361	78						
		18-I-47	362	78						
	8N	8-H-31	364	181						
	9N	8-H-31	365	217						
	10N	8-H-31	366	42						
	11N	18-I-47	367	181						
	12N	18-I-47	368	161						
	13N	18-I-47	369	43						
	14N	18-I-47	370	42						
	15N	18-I-64	371	181						
	16N	18-I-64	372	119						
		18-I-64	374	42						
	17N	18-I-64	373	43						
	18N	18-I-64	49	42						
	19N	31/2x21/2x5/16	374	175						
		31/2x21/2x5/16	375	175						
	20N	31/2x21/2x5/16	376	175						
		31/2x21/2x5/16	377	175						
	21N	31/2x21/2x5/16	378	180						
		31/2x21/2x5/16	379	180						
	22N	31/2x21/2x5/16	380	180						
		31/2x21/2x5/16	381	180						
Center Column	CC	14-I-87	385	384						
Knee	K1	8x8x/12	998	186						
Braces	K2	8x8x1/2	999	186						
Total Overstressed Members					0			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All Sections are Double Angles Unless Otherwise Noted

Table 9.12. Hangars 44 and 45 Truss T2 with Knee Braces, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
1	V t	18-I-64	76	118								
	b	18-I-64	50	42								
1	HT l	8x6x9/16	1	120								
	r	8x6x9/16	2	120								
1	HB	6x6x9/16	51	240								
1	D t	6x4x3/8	201	134								
	b	6x4x3/8	202	134								
1	BV	3x2.5x1/4	101	61								
1	BD	3x2x1/4	126	135								
2	V	6x4x3/8	77	163								
2	HT l	8x6x9/16	3	120								
	r	8x6x9/16	4	120								
2	HB	6x6x9/16	52	240								
2	D t	6x31/2x5/16	203	145								
	b	6x31/2x5/16	204	145								
2	BV	3x2.5x1/4	102	83								
2	BD	3x2x1/4	127	147								
3	V	6x4x3/8	78	167								
3	HT l	8x6x9/16	5	120								
	r	8x6x9/16	6	120								
3	HB	6x6x9/16	53	240								
3	D t	5x3x5/16	205	146	1.000	1.084	0.719	0.611	0.108	0.390	0.319	0.071
	b	5x3x5/16	206	146	1.000	1.084	0.698	0.591	0.107	0.379	0.308	0.071
3	BV	3x2.5x1/4	103	85								
3	BD	3x2x1/4	128	148								
4	V	6x31/2x5/16	79	170								
4	HT l	8x6x9/16	7	120								
	r	8x6x9/16	8	120								
4	HB	6x6x9/16	54	240								
4	D t	31/2x21/2x5/16	207	147	1.000	0.966	0.596	0.493	0.098	0.322	0.257	0.065
	b	31/2x21/2x5/16	208	147	1.000	0.966	0.555	0.457	0.098	0.303	0.238	0.065
4	BV	3x2.5x1/4	104	87								
4	BD	3x2x1/4	129	149								
5	V	6x31/2x5/16	80	173								
5	HT l	8x6x5/8	9	120								
	r	8x6x5/8	10	120								
5	HB	6x6x11/16	55	240								
5	D t	3x21/2x5/16	209	148								
	b	3x21/2x5/16	210	148								
5	BV	3x2.5x1/4	105	88								
5	BD	3x2x1/4	130	150								
6	V	6x31/2x5/16	81	177								
6	HT l	8x6x5/8	11	120								
	r	8x6x5/8	12	120								
6	HB	6x6x11/16	56	240								
6	D t	4x3x5/16	211	149								
	b	4x3x5/16	212	149								
6	BV	3x2.5x1/4	106	90								
6	BD	3x2x1/4	131	151								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed			No FOS *		
							Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
7	V	6x31/2x5/16	82	180								
7	HT l	8x6x5/8	13	120								
	r	8x6x5/8	14	120								
7	HB	6x6x11/16	57	240								
7	D b	3x2x5/16	213	151	1.000	0.767	0.837	0.720	0.116	0.452	0.376	0.077
	t	3x2x5/16	214	151	1.000	0.767	0.950	0.818	0.132	0.514	0.427	0.087
7	BV	3x2.5x1/4	107	90								
7	BD	3x2x1/4	132	149								
8	V	6x31/2x5/16	83	183								
8	HT l	8x6x5/8	15	120								
	r	8x6x5/8	16	120								
8	HB	6x6x11/16	58	240								
8	D b	3x21/2x5/16	215	152			2.711			0.436		
	t	3x21/2x5/16	216	152			11.061			0.439		
8	BV	3x2.5x1/4	108	92								
8	BD	3x2x1/4	133	150								
9	V	6x31/2x5/16	84	187								
9	HT l	8x6x9/16	17	120								
	r	8x6x9/16	18	120								
9	HB	6x6x9/16	59	240								
9	D b	31/2x21/2x5/16	217	153	1.000	0.966	1.255	0.966	0.289	0.695	0.504	0.191
	t	31/2x21/2x5/16	218	153	1.000	0.966	1.286	0.983	0.304	0.714	0.513	0.201
9	BV	3x2.5x1/4	109	93								
9	BD	3x2x1/4	134	151								
10	V	6x4x3/8	85	190								
10	HT l	8x6x9/16	19	120								
	r	8x6x9/16	20	120								
10	HB	6x6x9/16	60	240								
10	D b	4x3x5/16	219	154	1.000	1.168	1.017	0.801	0.216	0.560	0.418	0.143
	t	4x3x5/16	220	154	1.000	1.168	1.031	0.811	0.220	0.568	0.423	0.145
10	BV	3x2.5x1/4	110	95								
10	BD	3x2x1/4	135	152								
11	V	6x4x3/8	86	193								
11	HT l	8x6x9/16	21	120								
	r	8x6x9/16	22	120								
11	HB	6x6x9/16	61	240								
11	D b	6x31/2x6/16	221	155	1.000	1.380	0.713	0.601	0.112	0.388	0.314	0.074
	t	6x31/2x6/16	222	155	1.000	1.380	0.722	0.609	0.113	0.393	0.318	0.075
11	BV	3x2.5x1/4	111	97								
11	BD	3x2x1/4	136	153								
12	V	6x4x7/16	87	197								
12	HT l	8x6x9/16	23	120								
	r	8x6x9/16	24	120								
12	HB	6x6x9/16	62	240								
12	D b	6x31/2x3/8	223	156								
	t	6x31/2x3/8	224	156								
12	BV	3x2.5x1/4	112	98								
12	BD	3x2x1/4	137	154								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

								Computed			No FOS *	
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
13	V	14-I-87	88	200								
13	HT l	8x6x9/16	25	120								
	r	8x6x9/16	26	120								
13	HB	6x6x9/16	63	240								
13	D t	6x31/2x3/8	225	156								
	b	6x31/2x3/8	226	156								
13	BV	3x2.5x1/4	113	98								
13	BD	3x2x1/4	138	154								
14	V	6x4x7/16	89	197								
14	HT l	8x6x9/16	27	120								
	r	8x6x9/16	28	120								
14	HB	6x6x9/16	64	240								
14	D t	6x31/2x6/16	227	155	1.000	1.380	0.733	0.618	0.115	0.399	0.323	0.076
	b	6x31/2x6/16	228	155	1.000	1.380	0.724	0.610	0.114	0.394	0.319	0.075
14	BV	3x2.5x1/4	114	97								
14	BD	3x2x1/4	139	153								
15	V	6x4x3/8	90	193								
15	HT l	8x6x9/16	29	120								
	r	8x6x9/16	30	120								
15	HB	6x6x9/16	65	240								
15	D t	4x3x5/16	229	154	1.000	1.168	1.055	0.825	0.230	0.582	0.430	0.152
	b	4x3x5/16	230	154	1.000	1.168	1.042	0.816	0.226	0.575	0.426	0.149
15	BV	3x2.5x1/4	115	95								
15	BD	3x2x1/4	140	152								
16	V	6x4x3/8	91	190								
16	HT l	8x6x9/16	31	120								
	r	8x6x9/16	32	120								
16	HB	6x6x9/16	66	240								
16	D t	31/2x21/2x5/16	231	153	1.000	0.966	1.336	1.006	0.331	0.743	0.525	0.218
	b	31/2x21/2x5/16	232	153	1.000	0.966	1.306	0.991	0.315	0.725	0.517	0.208
16	BV	3x2.5x1/4	116	93								
16	BD	3x2x1/4	141	151								
17	V	6x31/2x5/16	92	187								
17	HT l	8x6x5/8	33	120								
	r	8x6x5/8	34	120								
17	HB	6x6x11/16	67	240								
17	D t	3x21/2x5/16	233	152			fa>Fe			0.439		
	b	3x21/2x5/16	234	152			9.502			0.432		
17	BV	3x2.5x1/4	117	92								
17	BD	3x2x1/4	142	150								
18	V	6x31/2x5/16	93	183								
18	HT l	8x6x5/8	35	120								
	r	8x6x5/8	36	120								
18	HB	6x6x11/16	68	240								
18	D t	3x2x5/16	235	151	1.000	0.767	0.994	0.852	0.141	0.538	0.445	0.093
	b	3x2x5/16	236	151	1.000	0.767	0.893	0.767	0.126	0.483	0.400	0.083
18	BV	3x2.5x1/4	118	90								
18	BD	3x2x1/4	143	149								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B33	Stress Ratio	AXL	B33
19	V	6x31/2x5/16	94	180								
19	HT l	8x6x5/8	37	120								
	r	8x6x5/8	38	120								
19	HB	6x6x11/16	69	240								
19	D b	4x3x5/16	237	149								
	t	4x3x5/16	238	149								
19	BV	3x2.5x1/4	119	90								
19	BD	3x2x1/4	144	149								
20	V	6x31/2x5/16	95	177								
20	HT l	8x6x5/8	39	120								
	r	8x6x5/8	40	120								
20	HB	6x6x11/16	70	240								
20	D b	3x21/2x5/16	239	148								
	t	3x21/2x5/16	240	148								
20	BV	3x2.5x1/4	120	88								
20	BD	3x2x1/4	145	148								
21	V	6x31/2x5/16	96	173								
21	HT l	8x6x9/16	41	120								
	r	8x6x9/16	42	120								
21	HB	6x6x9/16	71	240								
21	D b	31/2x21/2x5/16	241	147	1.000	0.966	0.527	0.432	0.095	0.288	0.225	0.063
	t	31/2x21/2x5/16	242	147	1.000	0.966	0.569	0.469	0.100	0.311	0.245	0.066
21	BV	3x2.5x1/4	121	87								
21	BD	3x2x1/4	146	147								
22	V	6x31/2x5/16	97	170								
22	HT l	8x6x9/16	43	120								
	r	8x6x9/16	44	120								
22	HB	6x6x9/16	72	240								
22	D b	5x3x5/16	243	146	1.000	1.084	0.677	0.571	0.106	0.368	0.298	0.070
	t	5x3x5/16	244	146	1.000	1.084	0.699	0.592	0.107	0.379	0.309	0.071
22	BV	3x2.5x1/4	122	85								
22	BD	3x2x1/4	147	146								
23	V	6x4x3/8	98	167								
23	HT l	8x6x9/16	45	120								
	r	8x6x9/16	46	120								
23	HB	6x6x9/16	73	240								
23	D b	6x31/2x5/16	245	145	1.000	1.380	0.534	0.436	0.098	0.293	0.229	0.065
	t	6x31/2x5/16	246	145	1.000	1.380	0.544	0.446	0.099	0.299	0.234	0.065
23	BV	3x2.5x1/4	123	83								
23	BD	3x2x1/4	148	145								
24	V	6x4x3/8	99	163								
24	HT l	8x6x9/16	47	120								
	r	8x6x9/16	48	120								
24	HB	6x6x9/16	74	240								
24	D b	6x4x3/8	247	144								
	t	6x4x3/8	248	144								
24	BV	3x2.5x1/4	124	82								
24	BD	3x2x1/4	149	144								
End	EV t	18-I-64	100	118								
	b	18-I-64	49	42								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
South End	1S	8-H-31	310	171								
		8-H-31	311	213								
		8-H-31	316	43								
	2S	18-I-47	312	132								
		18-I-47	314	39								
		18-I-47	315	83								
		18-I-47	317	130								
		18-I-47	319	43								
	3S	18-I-64	318	132								
		18-I-64	320	122								
		18-I-64	321	95								
		18-I-64	340	35								
	4S	8-I-17	301	78								
		14-I-30	302	312	1.000	0.848	1.048	0.802	0.246	0.581	0.418	0.162
	5S	10-I-21	303	78								
		14-I-30	304	312								
	6S	2 C's 12x40	305	312								
	7S	10-I-21	306	78								
	8S	2 C's 12x40	307	312								
	10S	3.5x2.5x5/16	324	169								
		3.5x2.5x5/16	325	169								
	11S	3.5x2.5x5/16	322	169								
		3.5x2.5x5/16	323	169								
	12S	3.5x2.5x5/16	328	169	1.000	0.966	0.504	0.425	0.078	0.273	0.222	0.051
		3.5x2.5x5/16	329	169	1.000	0.966	0.546	0.450	0.098	0.299	0.235	0.065
	13S	3.5x2.5x5/16	326	169	1.000	0.966	0.863	0.702	0.161	0.473	0.366	0.106
		3.5x2.5x5/16	327	169	1.000	0.966	0.798	0.676	0.122	0.433	0.353	0.081
	14S	3.5x2.5x5/16	332	169	1.000	0.966	0.651	0.550	0.101	0.354	0.287	0.067
		3.5x2.5x5/16	333	169	1.000	0.966	0.719	0.576	0.144	0.396	0.301	0.095
	15S	3.5x2.5x5/16	330	169	1.000	0.966	0.868	0.716	0.152	0.474	0.374	0.100
		3.5x2.5x5/16	331	169	1.000	0.966	0.801	0.691	0.110	0.433	0.361	0.073

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B33	Ratio	AXL	B33
North	1N	8-I-17	352	78								
End	2N	12-I-23	351	312	1.000	0.848	1.087	0.802	0.285	0.607	0.418	0.188
	3N	10-I-21	354	78								
	4N	14-I-30	353	312								
	5N	14-I-30	355	78								
		14-I-30	356	78								
		14-I-30	357	78								
		14-I-30	358	78								
	6N	10-I-21	363	78								
	7N	18-I-47	359	78								
		18-I-47	360	78								
		18-I-47	361	78								
		18-I-47	362	78								
	8N	8-H-31	364	181								
	9N	8-H-31	365	217								
	10N	8-H-31	366	42								
	11N	18-I-47	367	181								
	12N	18-I-47	368	161								
	13N	18-I-47	369	43								
	14N	18-I-47	370	42								
	15N	18-I-64	371	181								
	16N	18-I-64	372	119								
		18-I-64	374	42								
	17N	18-I-64	373	43								
	18N	18-I-64	49	42								
	19N	31/2x21/2x5/16	374	175	1.000	0.966	0.599	0.420	0.180	0.338	0.219	0.119
		31/2x21/2x5/16	375	175	1.000	0.966	0.535	0.445	0.090	0.292	0.232	0.059
	20N	31/2x21/2x5/16	376	175								
		31/2x21/2x5/16	377	175								
	21N	31/2x21/2x5/16	378	180	1.000	0.966	1.165	0.904	0.261	0.644	0.472	0.172
		31/2x21/2x5/16	379	180	1.000	0.966	1.239	0.929	0.310	0.689	0.485	0.205
	22N	31/2x21/2x5/16	380	180	1.000	0.966	0.957	0.748	0.209	0.528	0.390	0.138
		31/2x21/2x5/16	381	180	1.000	0.966	0.859	0.723	0.136	0.467	0.377	0.090
Center Column	CC	14-I-87	385	384								
Knee	K1	8x8x1/2	998	186								
Braces	K2	8x8x1/2	999	186								
		Total Overstressed Members					15			0		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

All Sections are Double Angles Unless Otherwise Noted

Table 9.13. Hangars 43 and 47 Truss T3 with Middle Knee Braces Stepped Wind Loading, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x5/8	7402	156.2						
		7x4x5/8	7403	156.2						
1	D2	7x4x5/8	7409	156.2						
		7x4x5/8	7410	156.2						
2	V	14-I-142	7381	200	0.788	0.678	0.110	0.479	0.407	0.073
2	HT	14-H-87	7351	240	0.676	0.446	0.230	0.419	0.268	0.152
2	HB	14-H-78	7363	240	1.024	0.699	0.325	0.634	0.419	0.215
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	1.205	0.887	0.319	0.743	0.532	0.211
3	HT	14-H-87	7352	240	0.673	0.482	0.191	0.415	0.289	0.126
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.580	0.513	0.066	0.351	0.308	0.044
4	HT	14-H-87	7353	240	0.560	0.392	0.168	0.346	0.235	0.111
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2	0.944	0.924	0.020	0.568	0.554	0.013
		5x3x5/16	7416	156.2	0.943	0.922	0.021	0.567	0.553	0.014
5	V	14x8 I-43	7384	200	1.011	0.740	0.271	0.623	0.444	0.179
5	HT	14-H-87	7354	240	0.594	0.365	0.230	0.371	0.219	0.152
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240	0.618	0.409	0.210	0.384	0.245	0.139
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.440	1.078	0.363	0.886	0.647	0.240
6	HT	14-H-87	7355	240						
6	HB	14-H-78	7367	240	0.554	0.272	0.282	0.349	0.163	0.186
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200	0.525	0.525	0.000	0.315	0.315	0.000
7	HT	14-H-87	7356	240						
7	HB	14-H-78	7368	240	0.500	0.266	0.235	0.315	0.160	0.155
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.427	1.066	0.360	0.877	0.640	0.238
8	HT	14-H-87	7357	240	0.574	0.352	0.222	0.358	0.211	0.147
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240	0.628	0.428	0.199	0.388	0.257	0.131
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200	0.995	0.704	0.291	0.614	0.422	0.192
9	HT	14-H-87	7358	240	0.540	0.392	0.148	0.333	0.235	0.098
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2	0.991	0.973	0.017	0.595	0.584	0.011
		5x3x5/16	7422	156.2	0.991	0.976	0.015	0.596	0.586	0.010
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.501	0.450	0.051	0.304	0.270	0.034
10	HT	14-H-87	7359	240	0.626	0.468	0.158	0.385	0.281	0.104
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	0.963	0.686	0.278	0.595	0.412	0.183
11	HT	14-H-87	7360	240	0.706	0.530	0.176	0.434	0.318	0.116
11	HB	14-H-78	7372	240	0.560	0.358	0.202	0.348	0.215	0.133
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200						
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.519	0.487	0.033	0.314	0.292	0.022
	top+bot	Laced								
12	D1	7x4x5/8	7427	156.2						
		7x4x5/8	7428	156.2						
12	D2	7x4x5/8	7429	156.2						
		7x4x5/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192	0.718	0.671	0.046	0.433	0.403	0.030
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192						
	4E	14-I-142	7380	192	0.797	0.598	0.199	0.490	0.359	0.131
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7	0.809	0.739	0.070	0.490	0.443	0.046
		7x4x5/8	7401	153.7	0.802	0.742	0.060	0.485	0.445	0.040
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7	0.825	0.771	0.055	0.499	0.463	0.036
		7x4x5/8	7399	153.7	0.838	0.773	0.065	0.507	0.464	0.043
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192						
End	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192	0.801	0.788	0.014	0.482	0.473	0.009
	4W	14-I-142	7392	192	0.658	0.511	0.147	0.404	0.307	0.097
	5W	7x4x5/8	7431	153.7	0.806	0.733	0.073	0.488	0.440	0.048
		7x4x5/8	7432	153.7	0.818	0.736	0.082	0.496	0.442	0.054
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.674	0.605	0.069	0.409	0.363	0.046
		7x4x5/8	7436	153.7	0.674	0.607	0.067	0.408	0.364	0.044
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center	CC1	33-I-200	7397	276	0.888	0.750	0.138	0.541	0.450	0.091
Column	CC2	33-I-200	8	108	0.613	0.501	0.112	0.375	0.301	0.074
Knee	K1	8x8x1/2	2	263	1.467	1.090	0.377	0.903	0.654	0.249
Braces	K2	8x8x1/2	3	263	1.694	1.197	0.497	1.046	0.718	0.328
Total Overstressed Members					5			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angles unless otherwise noted

Table 9.14. Hangars 43 and 47 Truss T3 with Middle Knee Braces Stepped Wind Loading, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240								
2	D1	14x12 I-78	7411	312.4			fa>Fe			1.025		
3	V	14x10 I-61	7382	200								
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.692	0.473	0.219	0.394	0.249	0.145
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.743		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	1.035	0.579	0.455	0.603	0.303	0.300
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2	1.000	1.615	0.523	0.499	0.023	0.278	0.263	0.015
		5x3x5/16	7414	156.2	1.000	1.615	0.500	0.459	0.041	0.269	0.242	0.027
4	D2	5x3x5/16	7415	156.2								
		5x3x5/16	7416	156.2								
5	V	14x8 I-43	7384	200								
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.533		
6	V	14x10 I-61	7385	200	1.072	2.445	0.642	0.476	0.166	0.362	0.252	0.110
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240								
6	D2	14x12 I-78	7418	312.4			fa>Fe			0.792		
7	V	33-I-200	7386	200								
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240								
7	D1	14x12 I-78	7419	312.4			fa>Fe			0.793		
8	V	14x10 I-61	7387	200	1.072	2.445	0.543	0.413	0.130	0.305	0.219	0.086
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.516		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200								
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	1.035	0.579	0.455	0.603	0.303	0.300
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2								
		5x3x5/16	7422	156.2								
9	D2	5x3x5/16	7423	156.2	1.000	1.615	0.704	0.648	0.055	0.378	0.341	0.036
		5x3x5/16	7424	156.2	1.000	1.615	0.685	0.653	0.033	0.366	0.344	0.022
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.692	0.473	0.219	0.394	0.249	0.145
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.628		
11	V	14x10 I-61	7390	200	1.072	2.445	0.662	0.454	0.208	0.378	0.241	0.137
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240								
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.798		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192								
	4E	14-I-142	7380	192								
	5E	7x4x5/8	7407	153.7	1.000	2.236	1.046	0.978	0.068	0.573	0.528	0.045
		7x4x5/8	7408	153.7	1.000	2.236	1.155	0.982	0.173	0.645	0.531	0.114
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	0.983	0.896	0.088	0.542	0.484	0.058
		7x4x5/8	7406	153.7	1.000	2.236	1.082	0.906	0.175	0.605	0.490	0.116
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
West End	1W	14-H-87	7394	192								
	2W	14-H-87	7395	192								
	3W	14-I-142	7391	192								
	4W	14-I-142	7392	192								
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.963	0.885	0.078	0.530	0.478	0.051
		7x4x5/8	7434	153.7	1.000	2.236	1.048	0.889	0.160	0.586	0.480	0.106
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.974	0.873	0.101	0.538	0.472	0.067
		7x4x5/8	7438	153.7	1.000	2.236	1.040	0.869	0.171	0.582	0.470	0.113
	9W	7x4x5/8	7375	240								
Center Column	CC1	33-I-200	7397	276	1.000	3.560	0.546	0.354	0.192	0.316	0.189	0.127
	CC2	33-I-200	8	108								
Knee Braces	K1	8x8x1/2	2	263	1.000	2.505	1.476	0.675	0.801	0.883	0.354	0.529
	K2	8x8x1/2	3	263	1.000	2.505	0.739	0.510	0.230	0.419	0.267	0.152
Total Overstressed Members							16			3		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All sections are double angles unless otherwise noted

Table 9.15. Hangars 43 and 47 Truss T3 with Middle Knee Braces Average Wind Loading, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x5/8	7402	156.2						
		7x4x5/8	7403	156.2						
1	D2	7x4x5/8	7409	156.2						
		7x4x5/8	7410	156.2						
2	V	14-I-142	7381	200						
2	HT	14-H-87	7351	240						
2	HB	14-H-78	7363	240						
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	0.812	0.618	0.194	0.499	0.371	0.128
3	HT	14-H-87	7352	240						
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.509	0.463	0.047	0.309	0.278	0.031
4	HT	14-H-87	7353	240						
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2	0.653	0.636	0.017	0.393	0.382	0.011
		5x3x5/16	7416	156.2	0.647	0.633	0.014	0.389	0.380	0.009
5	V	14x8 I-43	7384	200	0.858	0.664	0.195	0.527	0.398	0.129
5	HT	14-H-87	7354	240						
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240						
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.175	0.904	0.271	0.721	0.542	0.179
6	HT	14-H-87	7355	240						
6	HB	14-H-78	7367	240						
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200						
7	HT	14-H-87	7356	240						
7	HB	14-H-78	7368	240						
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.175	0.904	0.271	0.721	0.542	0.179
8	HT	14-H-87	7357	240						
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240						
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress Ratio			Stress Ratio		
Bay	Mem.	Section	#	Length		AXL	B22		AXL	B22
9	V	14x8 I-43	7388	200	0.858	0.664	0.195	0.527	0.398	0.129
9	HT	14-H-87	7358	240						
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2	0.647	0.633	0.014	0.389	0.380	0.009
		5x3x5/16	7422	156.2	0.653	0.636	0.017	0.393	0.382	0.011
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.509	0.463	0.047	0.309	0.278	0.031
10	HT	14-H-87	7359	240						
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	0.812	0.618	0.194	0.499	0.371	0.128
11	HT	14-H-87	7360	240						
11	HB	14-H-78	7372	240						
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200						
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240						
	top+bot	Laced								
12	D1	7x4x5/8	7427	156.2						
		7x4x5/8	7428	156.2						
12	D2	7x4x5/8	7429	156.2						
		7x4x5/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192	0.623	0.571	0.053	0.378	0.343	0.035
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192						
	4E	14-I-142	7380	192						
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7	0.660	0.619	0.036	0.395	0.371	0.024
		7x4x5/8	7401	153.7	0.657	0.621	0.036	0.396	0.373	0.024
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7	0.744	0.692	0.052	0.450	0.415	0.034
		7x4x5/8	7399	153.7	0.756	0.695	0.062	0.458	0.417	0.041
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192						
End	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192						
	4W	14-I-142	7392	192						
	5W	7x4x5/8	7431	153.7	0.682	0.621	0.060	0.412	0.373	0.040
		7x4x5/8	7432	153.7	0.700	0.624	0.076	0.425	0.374	0.050
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.555	0.526	0.029	0.335	0.316	0.019
		7x4x5/8	7436	153.7	0.594	0.529	0.066	0.361	0.317	0.044
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center	CC1	33-I-200	7397	276	0.579	0.579	0.000	0.347	0.347	0.000
Column	CC2	33-I-200	8	108						
Knee	K1	8x8x1/2	2	263	0.898	0.854	0.043	0.541	0.512	0.028
Braces	K2	8x8x1/2	3	263	0.898	0.854	0.043	0.541	0.512	0.028
		Total Overstressed Members			2			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 9.16. Hangars 43 and 47 Truss T3 with Middle Knee Braces Average Wind Loading, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240	1.000	2.478	0.574	0.320	0.251	0.334	0.169	0.166
2	D1	14x12 I-78	7411	312.4			fa>Fe			0.628		
3	V	14x10 I-61	7382	200	1.072	2.445	0.528	0.388	0.140	0.298	0.206	0.092
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.529	0.367	0.162	0.300	0.193	0.107
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.505		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	0.767	0.457	0.310	0.443	0.239	0.205
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2								
		5x3x5/16	7414	156.2								
4	D2	5x3x5/16	7415	156.2	1.000	1.615	0.770	0.752	0.018	0.408	0.396	0.012
		5x3x5/16	7416	156.2	1.000	1.615	0.774	0.758	0.016	0.410	0.399	0.011
5	V	14x8 I-43	7384	200	1.039	1.894	0.588	0.428	0.160	0.330	0.224	0.106
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.137		
6	V	14x10 I-61	7385	200	1.072	2.445	0.968	0.674	0.293	0.551	0.357	0.193
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240								
6	D2	14x12 I-78	7418	312.4			fa>Fe			0.613		
7	V	33-I-200	7386	200								
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240								
7	D1	14x12 I-78	7419	312.4			fa>Fe			0.613		
8	V	14x10 I-61	7387	200	1.072	2.445	0.968	0.674	0.293	0.551	0.357	0.193
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240	1.000	2.478	0.568	0.391	0.176	0.322	0.206	0.116
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.137		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
9	V	14x8 I-43	7388	200	1.039	1.894	0.588	0.428	0.160	0.330	0.224	0.106
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	0.767	0.457	0.310	0.443	0.239	0.205
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2	1.000	1.615	0.573	0.562	0.011	0.303	0.296	0.007
		5x3x5/16	7422	156.2	1.000	1.615	0.570	0.556	0.014	0.302	0.293	0.009
9	D2	5x3x5/16	7423	156.2								
		5x3x5/16	7424	156.2								
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.529	0.367	0.162	0.300	0.193	0.107
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.505		
11	V	14x10 I-61	7390	200	1.072	2.445	0.528	0.388	0.140	0.298	0.206	0.092
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	1.620	0.843	0.777	0.957	0.444	0.513
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.628		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192	1.000	3.982	1.108	0.996	0.112	0.626	0.552	0.074
	4E	14-I-142	7380	192	1.000	3.982	0.755	0.570	0.185	0.438	0.316	0.122
	5E	7x4x5/8	7407	153.7	1.000	2.236	1.022	0.967	0.055	0.559	0.522	0.036
		7x4x5/8	7408	153.7	1.000	2.236	1.152	0.971	0.181	0.644	0.525	0.119
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	0.975	0.889	0.085	0.536	0.480	0.056
		7x4x5/8	7406	153.7	1.000	2.236	1.082	0.893	0.189	0.607	0.482	0.125
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

Bay	Mem.	Section	#	Length	K	r	Computed Stress Ratio	Computed AXL	Computed B22	No FOS * Stress Ratio	No FOS * AXL	No FOS * B22
West End	1W	14-H-87	7394	192	1.000	3.696	1.007	0.888	0.119	0.568	0.490	0.079
	2W	14-H-87	7395	192	1.000	3.696	0.521	0.375	0.146	0.303	0.207	0.096
	3W	14-I-142	7391	192								
	4W	14-I-142	7392	192	3.792	3.982	0.613	0.526	0.087	0.332	0.274	0.057
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.944	0.864	0.080	0.520	0.467	0.053
		7x4x5/8	7434	153.7	1.000	2.236	0.976	0.862	0.113	0.540	0.466	0.075
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.922	0.832	0.090	0.509	0.450	0.059
		7x4x5/8	7438	153.7	1.000	2.236	1.010	0.834	0.177	0.567	0.451	0.117
	9W	7x4x5/8	7375	240								
Center Column	CC1	33-I-200	7397	276	1.000	3.560	0.684	0.433	0.251	0.397	0.232	0.166
	CC2	33-I-200	8	108	3.080	3.560	0.501	0.298	0.203	0.291	0.157	0.134
Knee Braces	K1	8x8x1/2	2	263	1.000	2.505	1.100	1.031	0.069	0.586	0.541	0.046
	K2	8x8x1/2	3	263	1.000	2.505	1.100	1.031	0.069	0.586	0.541	0.046
Total Overstressed Members							15			2		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 9.17. Hangars 44 and 45 Truss T3 with Middle Knee Braces Stepped Wind Loading, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x5/8	7402	156.2						
		7x4x5/8	7403	156.2						
1	D2	7x4x5/8	7409	156.2						
		7x4x5/8	7410	156.2						
2	V	14-I-142	7381	200	0.798	0.683	0.115	0.486	0.410	0.076
2	HT	14-H-87	7351	240	0.686	0.453	0.234	0.426	0.272	0.154
2	HB	14-H-78	7363	240	1.035	0.706	0.330	0.641	0.424	0.218
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	1.214	0.891	0.322	0.747	0.535	0.213
3	HT	14-H-87	7352	240	0.638	0.490	0.193	0.421	0.294	0.127
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.583	0.515	0.068	0.354	0.309	0.045
4	HT	14-H-87	7353	240	0.568	0.398	0.170	0.351	0.239	0.112
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2	0.955	0.935	0.050	0.594	0.561	0.033
		5x3x5/16	7416	156.2	0.954	0.933	0.022	0.574	0.560	0.015
5	V	14x8 I-43	7384	200	1.018	0.742	0.275	0.627	0.445	0.182
5	HT	14-H-87	7354	240	0.603	0.370	0.233	0.376	0.222	0.154
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240	0.626	0.414	0.212	0.388	0.248	0.140
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.458	1.089	0.368	0.896	0.653	0.243
6	HT	14-H-87	7355	240						
6	HB	14-H-78	7367	240	0.563	0.276	0.288	0.356	0.166	0.190
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200	0.533	0.533	0.000	0.320	0.320	0.000
7	HT	14-H-87	7356	240						
7	HB	14-H-78	7368	240	0.510	0.269	0.241	0.320	0.161	0.159
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.444	1.078	0.366	0.888	0.647	0.242
8	HT	14-H-87	7357	240	0.582	0.357	0.225	0.363	0.214	0.149
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240	0.635	0.433	0.202	0.393	0.260	0.133
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
Bay	Mem.	Section	#	Length						
9	V	14x8 I-43	7388	200	0.985	0.710	0.275	0.608	0.426	0.182
9	HT	14-H-87	7358	240	0.549	0.399	0.150	0.338	0.239	0.099
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2	1.001	0.984	0.017	0.602	0.590	0.011
		5x3x5/16	7422	156.2	1.002	0.986	0.016	0.602	0.592	0.011
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200	0.505	0.452	0.053	0.306	0.271	0.035
10	HT	14-H-87	7359	240	0.636	0.476	0.160	0.391	0.286	0.106
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200	0.973	0.690	0.282	0.600	0.414	0.186
11	HT	14-H-87	7360	240	0.715	0.537	0.179	0.440	0.322	0.118
11	HB	14-H-78	7372	240	0.571	0.365	0.207	0.356	0.219	0.137
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200	0.592	0.506	0.085	0.360	0.304	0.056
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.523	0.490	0.033	0.316	0.294	0.022
	top+bot	Laced								
12	D1	7x4x5/8	7427	156.2						
		7x4x5/8	7428	156.2						
12	D2	7x4x5/8	7429	156.2						
		7x4x5/8	7430	156.2						
End	EV	14-H-87	7396	200						
East	1E	14-H-87	7376	192	0.716	0.670	0.046	0.432	0.402	0.030
End	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192						
	4E	14-I-142	7380	192	0.878	0.609	0.269	0.543	0.365	0.178
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7	0.814	0.743	0.071	0.493	0.446	0.047
		7x4x5/8	7401	153.7	0.807	0.746	0.061	0.488	0.448	0.040
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7	0.829	0.774	0.054	0.500	0.464	0.036
		7x4x5/8	7399	153.7	0.842	0.777	0.066	0.510	0.466	0.044
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667

x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192						
End	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192	0.810	0.797	0.013	0.487	0.478	0.009
	4W	14-I-142	7392	192	0.671	0.521	0.150	0.412	0.313	0.099
	5W	7x4x5/8	7431	153.7	0.805	0.732	0.073	0.487	0.439	0.048
		7x4x5/8	7432	153.7	0.817	0.735	0.082	0.495	0.441	0.054
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.672	0.603	0.069	0.407	0.362	0.046
		7x4x5/8	7436	153.7	0.672	0.605	0.067	0.407	0.363	0.044
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center	CC1	33-I-200	7397	276	0.903	0.765	0.138	0.550	0.459	0.091
Column	CC2	33-I-200	8	108	0.623	0.511	0.112	0.381	0.307	0.074
Knee	K1	8x8x1/2	2	263	1.496	1.111	0.385	0.921	0.667	0.254
Braces	K2	8x8x1/2	3	263	1.722	1.217	0.504	1.063	0.730	0.333
		Total Overstressed Members			9			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angles unless otherwise noted

Table 9.18. Hangars 44 and 45 Truss T3 with Middle Knee Braces Stepped Wind Loading, Compression.

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240								
2	D1	14x12 I-78	7411	312.4			fa>Fe			1.045		
3	V	14x10 I-61	7382	200								
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.706	0.482	0.225	0.402	0.254	0.149
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.754		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	1.061	0.590	0.472	0.620	0.308	0.312
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2	1.000	1.615	0.540	0.516	0.024	0.288	0.272	0.016
		5x3x5/16	7414	156.2	1.000	1.615	0.557	0.512	0.045	0.299	0.270	0.030
4	D2	5x3x5/16	7415	156.2								
		5x3x5/16	7416	156.2								
5	V	14x8 I-43	7384	200								
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.370		
6	V	14x10 I-61	7385	200	1.072	2.445	0.614	0.459	0.155	0.346	0.243	0.102
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240								
6	D2	14x12 I-78	7418	312.4			fa>Fe			0.813		
7	V	33-I-200	7386	200	1.856	3.560	0.533	0.533	0.000	0.280	0.280	0.000
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240								
7	D1	14x12 I-78	7419	312.4			fa>Fe			0.808		
8	V	14x10 I-61	7387	200	1.072	2.445	0.516	0.396	0.120	0.289	0.210	0.079
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.341		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
9	V	14x8 I-43	7388	200								
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	1.061	0.590	0.472	0.620	0.308	0.312
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2								
		5x3x5/16	7422	156.2								
9	D2	5x3x5/16	7423	156.2	1.000	1.615	0.722	0.664	0.057	0.387	0.350	0.038
		5x3x5/16	7424	156.2	1.000	1.615	0.702	0.668	0.034	0.374	0.352	0.022
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.815	0.436	0.379	0.480	0.230	0.250
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.639		
11	V	14x10 I-61	7390	200	1.072	2.445	0.648	0.447	0.201	0.370	0.237	0.133
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	1.509	0.810	0.700	0.889	0.427	0.462
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.814		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192								
	4E	14-I-142	7380	192								
	5E	7x4x5/8	7407	153.7	1.000	2.236	1.048	0.979	0.068	0.574	0.529	0.045
		7x4x5/8	7408	153.7	1.000	2.236	1.156	0.983	0.173	0.645	0.531	0.114
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	0.986	0.898	0.088	0.543	0.485	0.058
		7x4x5/8	7406	153.7	1.000	2.236	1.084	0.909	0.175	0.607	0.491	0.116
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
							Stress			Stress		
Bay	Mem.	Section	#	Length	K	r	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192	1.000	3.696	0.718	0.702	0.015	0.397	0.387	0.010
End	2W	14-H-87	7395	192								
	3W	14-I-142	7391	192								
	4W	14-I-142	7392	192								
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.957	0.880	0.077	0.526	0.475	0.051
		7x4x5/8	7434	153.7	1.000	2.236	1.041	0.883	0.158	0.581	0.477	0.104
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.967	0.868	0.099	0.534	0.469	0.065
		7x4x5/8	7438	153.7	1.000	2.236	1.035	0.860	0.170	0.577	0.465	0.112
	9W	7x4x5/8	7375	240								
Center	CC1	33-I-200	7397	276	1.000	3.560	0.523	0.334	0.189	0.304	0.179	0.125
Column	CC2	33-I-200	8	108								
Knee	K1	8x8x1/2	2	263	1.000	2.505	1.358	0.638	0.720	0.810	0.335	0.475
Braces	K2	8x8x1/2	3	263	1.000	2.505	0.677	0.473	0.203	0.382	0.248	0.134
Total Overstressed Members							17			3		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand
All sections are double angles unless otherwise noted

Table 9.19. Hangars 44 and 45 Truss T3 with Middle Knee Braces Average Wind Loading, Tension.

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
1	V	14-H-87	7378	200						
1	HT	2 C 12-30	7350	240						
	top	P 14x3/8								
	bot	Laced								
1	HB	2 C 12-25	7362	240						
	top+bot	Laced								
1	D1	7x4x5/8	7402	156.2						
		7x4x5/8	7403	156.2						
1	D2	7x4x5/8	7409	156.2						
		7x4x5/8	7410	156.2						
2	V	14-I-142	7381	200						
2.	HT	14-H-87	7351	240						
2	HB	14-H-78	7363	240	0.518	0.412	0.106	0.317	0.247	0.070
2	D1	14x12 I-78	7411	312.4						
3	V	14x10 I-61	7382	200	0.820	0.622	0.198	0.504	0.373	0.131
3	HT	14-H-87	7352	240						
		2 P 11x1/2		768						
3	HB	14-H-78	7364	240						
3	D1	14x8 I-43	7412	312.4						
4	V	14x8 I-43	7383	200	0.507	0.460	0.047	0.307	0.276	0.031
4	HT	14-H-87	7353	240						
		2 P 11x1/2		768						
4	HB	14-H-78	7365	240						
		2 P 11x1/2		288						
4	D1	5x3x5/16	7413	156.2						
		5x3x5/16	7414	156.2						
4	D2	5x3x5/16	7415	156.2	0.663	0.646	0.017	0.399	0.388	0.011
		5x3x5/16	7416	156.2	0.658	0.644	0.014	0.396	0.386	0.009
5	V	14x8 I-43	7384	200	0.865	0.666	0.199	0.531	0.400	0.131
5	HT	14-H-87	7354	240						
		2 P 11x1/2		768						
5	HB	14-H-78	7366	240						
5	D2	14x8 I-43	7417	312.4						
6	V	14x10 I-61	7385	200	1.192	0.916	0.276	0.732	0.550	0.182
6	HT	14-H-87	7355	240						
6	HB	14-H-78	7367	240						
6	D2	14x12 I-78	7418	312.4						
7	V	33-I-200	7386	200						
7	HT	14-H-87	7356	240						
7	HB	14-H-78	7368	240						
7	D1	14x12 I-78	7419	312.4						
8	V	14x10 I-61	7387	200	1.192	0.916	0.276	0.732	0.550	0.182
8	HT	14-H-87	7357	240						
		2 P 11x1/2		768						
8	HB	14-H-78	7369	240						
8	D1	14x8 I-43	7420	312.4						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
Bay	Mem.	Section	#	Length	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200						
9	HT	14-H-87	7358	240						
		2 P 11x1/2		768						
9	HB	14-H-78	7370	240						
		2 P 11x1/2		288						
9	D1	5x3x5/16	7421	156.2	0.658	0.644	0.014	0.396	0.386	0.009
		5x3x5/16	7422	156.2	0.663	0.646	0.017	0.399	0.388	0.011
9	D2	5x3x5/16	7423	156.2						
		5x3x5/16	7424	156.2						
10	V	14x8 I-43	7389	200						
10	HT	14-H-87	7359	240						
		2 P 11x1/2		768						
10	HB	14-H-78	7371	240						
10	D2	14x8 I-43	7425	312.4						
11	V	14x10 I-61	7390	200						
11	HT	14-H-87	7360	240						
11	HB	14-H-78	7372	240						
11	D2	14x12 I-78	7426	312.4						
12	V	14-I-142	7393	200						
12	HT	2 C 12-30	7361	240						
	top	P 14x3/8								
	bot	Laced								
12	HB	2 C 12-25	7373	240	0.560	0.440	0.120	0.343	0.264	0.079
	top+bot	Laced								
12	D1	7x4x5/8	7427	156.2						
		7x4x5/8	7428	156.2						
12	D2	7x4x5/8	7429	156.2						
		7x4x5/8	7430	156.2						
End	EV	14-H-87	7396	200						
East End	1E	14-H-87	7376	192						
	2E	14-H-87	7377	192						
	3E	14-I-142	7379	192						
	4E	14-I-142	7380	192						
	5E	7x4x5/8	7407	153.7						
		7x4x5/8	7408	153.7						
	6E	7x4x5/8	7400	153.7						
		7x4x5/8	7401	153.7						
	7E	7x4x5/8	7405	153.7						
		7x4x5/8	7406	153.7						
	8E	7x4x5/8	7398	153.7						
		7x4x5/8	7399	153.7						
	9E	7x4x5/8	7374	240						

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand

					Computed			No FOS *		
					Stress			Stress		
Bay	Mem.	Section	#	Length	Ratio	AXL	B22	Ratio	AXL	B22
West	1W	14-H-87	7394	192						
End	2W	14-H-87	7395	192						
	3W	14-I-142	7391	192						
	4W	14-I-142	7392	192						
	5W	7x4x5/8	7431	153.7	0.718	0.657	0.061	0.434	0.394	0.040
		7x4x5/8	7432	153.7	0.736	0.659	0.076	0.446	0.395	0.050
	6W	7x4x5/8	7433	153.7						
		7x4x5/8	7434	153.7						
	7W	7x4x5/8	7435	153.7	0.592	0.542	0.050	0.358	0.325	0.033
		7x4x5/8	7436	153.7	0.604	0.544	0.060	0.366	0.326	0.040
	8W	7x4x5/8	7437	153.7						
		7x4x5/8	7438	153.7						
	9W	7x4x5/8	7375	240						
Center	CC1	33-I-200	7397	276	0.593	0.593	0.000	0.356	0.356	0.000
Column	CC2	33-I-200	8	108						
Knee	K1	8x8x1/2	2	263	0.919	0.875	0.045	0.555	0.525	0.030
Braces	K2	8x8x1/2	3	263	0.919	0.875	0.045	0.555	0.525	0.030
		Total Overstressed Members			2			0		

* The Factor of Safety for Bending is 1.5 for Tension it is 1.667
x Element Section Properties Calculated by Hand
All sections are double angle unless otherwise noted

Table 9.20. Hangars 44 and 45 Truss T3 with Middle Knee Braces Average Wind Loading, Compression.

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
1	V	14-H-87	7378	200								
1	HT	2 C 12-30	7350	240								
	top	P 14x3/8										
	bot	Laced										
1	HB	2 C 12-25	7362	240								
	top+bot	Laced										
1	D1	7x4x5/8	7402	156.2								
		7x4x5/8	7403	156.2								
1	D2	7x4x5/8	7409	156.2								
		7x4x5/8	7410	156.2								
2	V	14-I-142	7381	200								
2	HT	14-H-87	7351	240								
2	HB	14-H-78	7363	240	1.000	2.478	0.551	0.309	0.242	0.323	0.163	0.160
2	D1	14x12 I-78	7411	312.4			fa>Fe			0.643		
3	V	14x10 I-61	7382	200	1.072	2.445	0.516	0.382	0.134	0.291	0.203	0.088
3	HT	14-H-87	7352	240								
		2 P 11x1/2		768								
3	HB	14-H-78	7364	240	1.000	2.478	0.543	0.376	0.166	0.308	0.198	0.110
3	D1	14x8 I-43	7412	312.4			fa>Fe			0.515		
4	V	14x8 I-43	7383	200								
4	HT	14-H-87	7353	240								
		2 P 11x1/2		768								
4	HB	14-H-78	7365	240	1.000	2.095	0.788	0.468	0.320	0.456	0.245	0.211
		2 P 11x1/2		288								
4	D1	5x3x5/16	7413	156.2								
		5x3x5/16	7414	156.2								
4	D2	5x3x5/16	7415	156.2	1.000	1.615	0.568	0.558	0.011	0.301	0.294	0.007
		5x3x5/16	7416	156.2	1.000	1.615	0.574	0.563	0.010	0.303	0.297	0.007
5	V	14x8 I-43	7384	200	1.039	1.894	0.577	0.423	0.153	0.322	0.221	0.101
5	HT	14-H-87	7354	240								
		2 P 11x1/2		768								
5	HB	14-H-78	7366	240								
5	D2	14x8 I-43	7417	312.4			fa>Fe			1.164		
6	V	14x10 I-61	7385	200	1.072	2.445	0.933	0.657	0.276	0.531	0.348	0.182
6	HT	14-H-87	7355	240								
6	HB	14-H-78	7367	240								
6	D2	14x12 I-78	7418	312.4			fa>Fe			0.627		
7	V	33-I-200	7386	200								
7	HT	14-H-87	7356	240								
7	HB	14-H-78	7368	240								
7	D1	14x12 I-78	7419	312.4			fa>Fe			0.638		
8	V	14x10 I-61	7387	200	1.072	2.445	0.933	0.657	0.276	0.531	0.348	0.182
8	HT	14-H-87	7357	240								
		2 P 11x1/2		768								
8	HB	14-H-78	7369	240								
8	D1	14x8 I-43	7420	312.4			fa>Fe			1.164		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
9	V	14x8 I-43	7388	200	1.039	1.894	0.577	0.423	0.153	0.322	0.221	0.101
9	HT	14-H-87	7358	240								
		2 P 11x1/2		768								
9	HB	14-H-78	7370	240	1.000	2.095	0.788	0.468	0.320	0.456	0.245	0.211
		2 P 11x1/2		288								
9	D1	5x3x5/16	7421	156.2	1.000	1.615	0.555	0.545	0.011	0.294	0.287	0.007
		5x3x5/16	7422	156.2	1.000	1.615	0.552	0.539	0.013	0.293	0.284	0.009
9	D2	5x3x5/16	7423	156.2								
		5x3x5/16	7424	156.2								
10	V	14x8 I-43	7389	200								
10	HT	14-H-87	7359	240								
		2 P 11x1/2		768								
10	HB	14-H-78	7371	240	1.000	2.478	0.543	0.376	0.166	0.308	0.198	0.110
10	D2	14x8 I-43	7425	312.4			fa>Fe			0.515		
11	V	14x10 I-61	7390	200	1.000	1.072	2.445	0.382	0.134	0.288	0.199	0.088
11	HT	14-H-87	7360	240								
11	HB	14-H-78	7372	240	1.000	2.478	0.854	0.527	0.327	0.493	0.278	0.216
11	D2	14x12 I-78	7426	312.4			fa>Fe			0.643		
12	V	14-I-142	7393	200								
12	HT	2 C 12-30	7361	240								
	top	P 14x3/8										
	bot	Laced										
12	HB	2 C 12-25	7373	240								
	top+bot	Laced										
12	D1	7x4x5/8	7427	156.2								
		7x4x5/8	7428	156.2								
12	D2	7x4x5/8	7429	156.2								
		7x4x5/8	7430	156.2								
End	EV	14-H-87	7396	200								
East End	1E	14-H-87	7376	192								
	2E	14-H-87	7377	192								
	3E	14-I-142	7379	192	1.000	3.982	0.896	0.736	0.160	0.514	0.408	0.106
	4E	14-I-142	7380	192	3.792	3.982	0.590	0.508	0.082	0.319	0.265	0.054
	5E	7x4x5/8	7407	153.7	1.000	2.236	0.731	0.677	0.053	0.401	0.366	0.035
		7x4x5/8	7408	153.7	1.000	2.236	0.789	0.681	0.109	0.440	0.368	0.072
	6E	7x4x5/8	7400	153.7								
		7x4x5/8	7401	153.7								
	7E	7x4x5/8	7405	153.7	1.000	2.236	0.627	0.577	0.050	0.345	0.312	0.033
		7x4x5/8	7406	153.7	1.000	2.236	0.693	0.581	0.112	0.388	0.314	0.074
	8E	7x4x5/8	7398	153.7								
		7x4x5/8	7399	153.7								
	9E	7x4x5/8	7374	240								

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3
x Element Section Properties Calculated by Hand

							Computed			No FOS *		
Bay	Mem.	Section	#	Length	K	r	Stress Ratio	AXL	B22	Stress Ratio	AXL	B22
West End	1W	14-H-87	7394	192	1.000	3.696	0.977	0.752	0.225	0.563	0.415	0.149
	2W	14-H-87	7395	192								
	3W	14-I-142	7391	192	1.000	3.792	0.528	0.466	0.062	0.298	0.258	0.041
	4W	14-I-142	7392	192	1.000	3.792	3.982	0.508	0.082	0.335	0.281	0.054
	5W	7x4x5/8	7431	153.7								
		7x4x5/8	7432	153.7								
	6W	7x4x5/8	7433	153.7	1.000	2.236	0.640	0.593	0.047	0.351	0.320	0.031
		7x4x5/8	7434	153.7	1.000	2.236	0.686	0.597	0.088	0.381	0.323	0.058
	7W	7x4x5/8	7435	153.7								
		7x4x5/8	7436	153.7								
	8W	7x4x5/8	7437	153.7	1.000	2.236	0.819	0.759	0.060	0.450	0.410	0.040
		7x4x5/8	7438	153.7	1.000	2.236	0.890	0.763	0.127	0.496	0.412	0.084
	9W	7x4x5/8	7375	240								
Center Column	CC1	33-I-200	7397	276	1.000	1.000	3.560	0.559	0.000	0.292	0.292	0.000
	CC2	33-I-200	8	108								
Knee Braces	K1	8x8x1/2	2	263	1.000	2.505	1.059	0.995	0.064	0.564	0.522	0.042
	K2	8x8x1/2	3	263	1.000	2.505	1.059	0.995	0.064	0.564	0.522	0.042
Total Overstressed Members							8			2		

* Factor of Safety for Bending is 1.5, for Axial Compression it is 5/3+3/8x(KL/rCc)-1/8x(KL/rCc)^3

x Element Section Properties Calculated by Hand

All sections are double angle unless otherwise noted

Appendix A: Photographs of Structural Elements and Details from Hangar Inspections

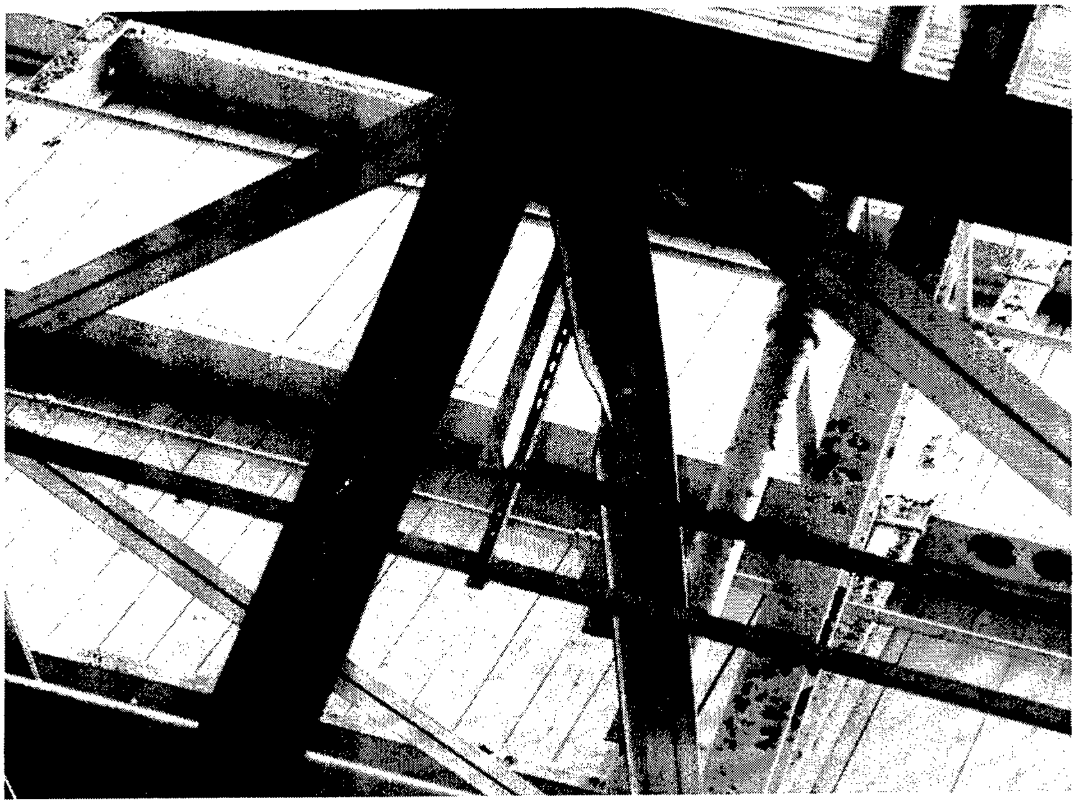

Figure A-1. Hangar 43, bent vertical member.

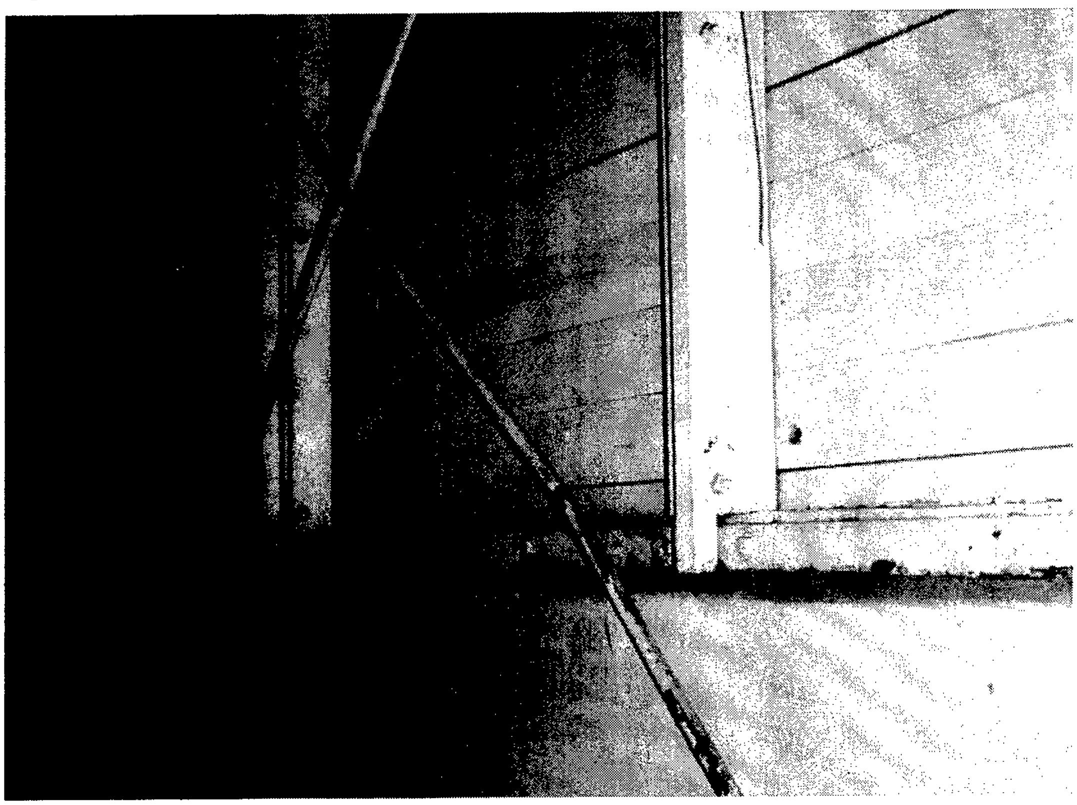

Figure A-2. Hangar 44, one bent and one loose bracing rod in column line AA northwest door pocket.

Figure A-3. Hangar 44, buckled diagonal brace.

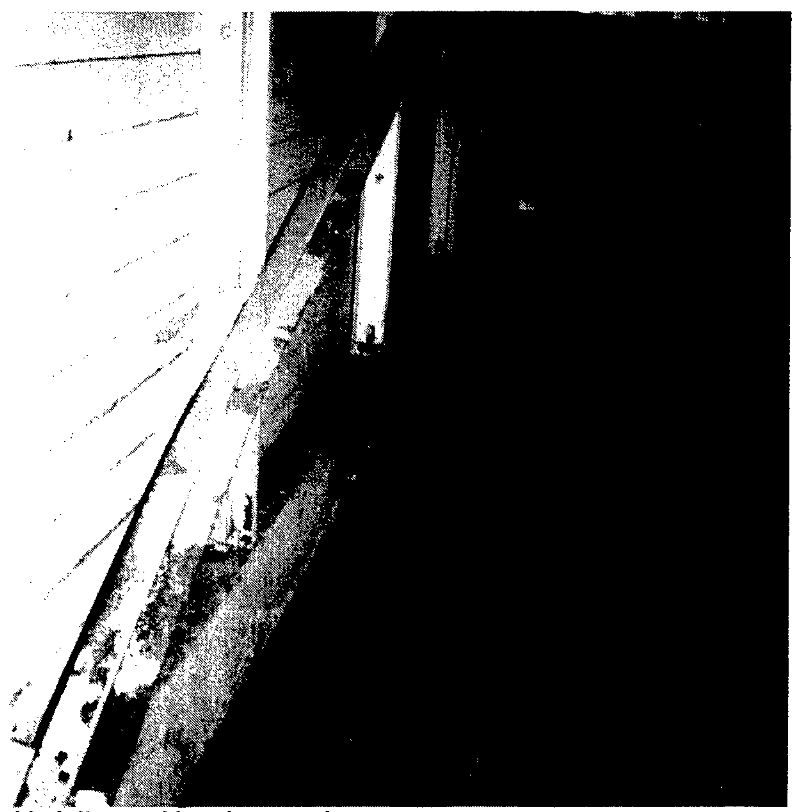

Figure A-4. Hangar 44, buckled diagonal bracing members.

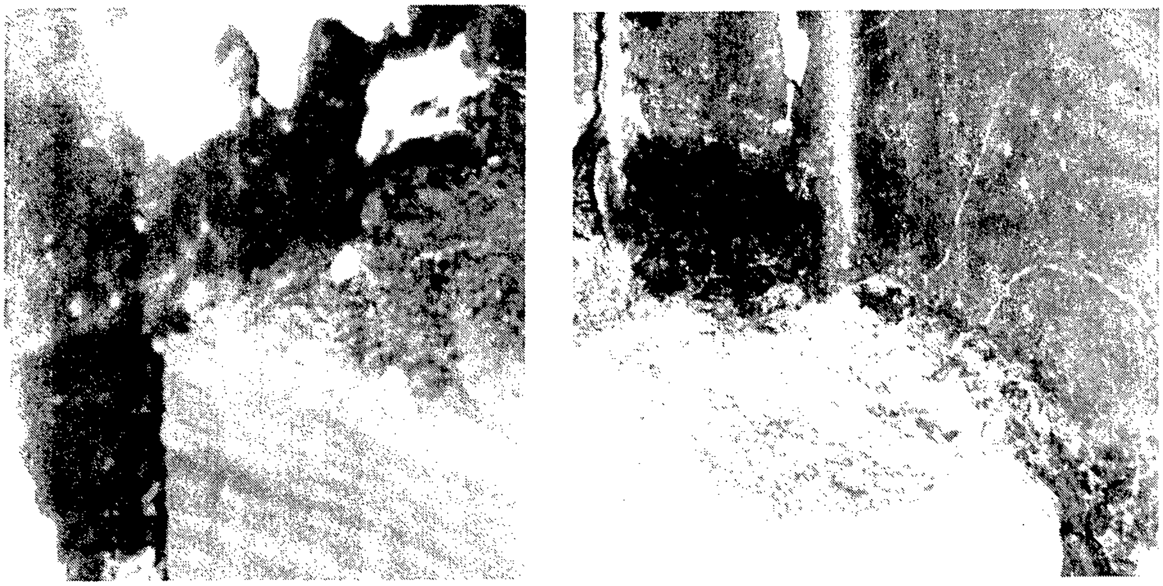

Figure A-5. Hangar 44, corroded flanges of column AA-½, east flange (left), west flange (right).

Figure A-6. Hangar 44, corroded flange and web of column AA-1½.

Figure A-7. Hangar 44, split in the flange of column A-½ from corrosion.

Figure A-8. Hangar 44, corrosion of column N-5.

Figure A-9. Hangar 44, major corrosion in base of column A-1.

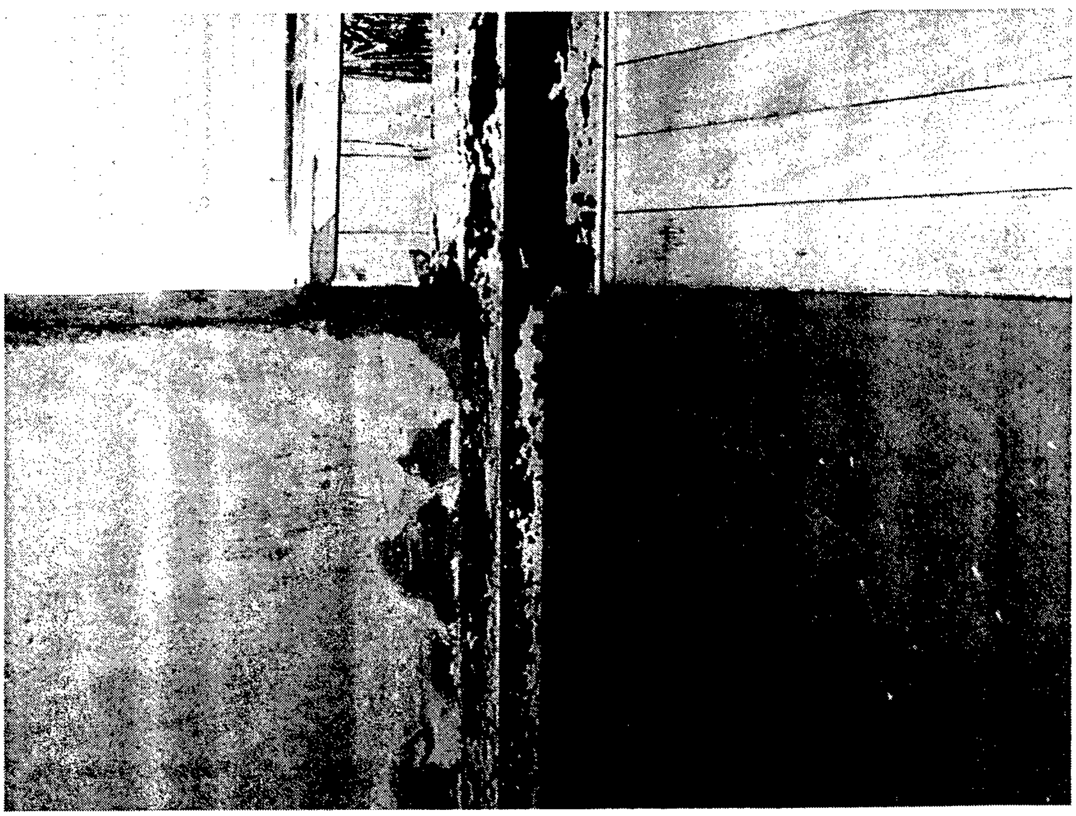

Figure A-10. Hangar 44, corrosion of column N-5½.

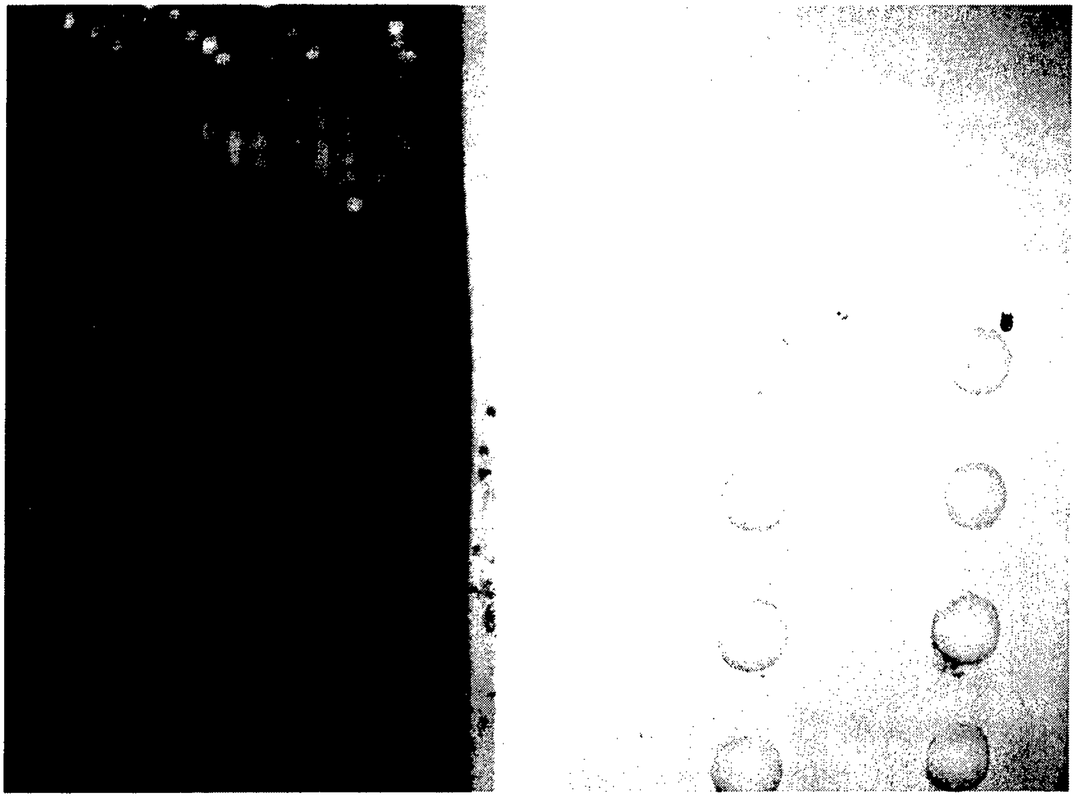

Figure A-11. Hangar 44, column A-4 with bent flange and corroded base.

Figure A-12. Hangar 44, corrosion of column A-5½.

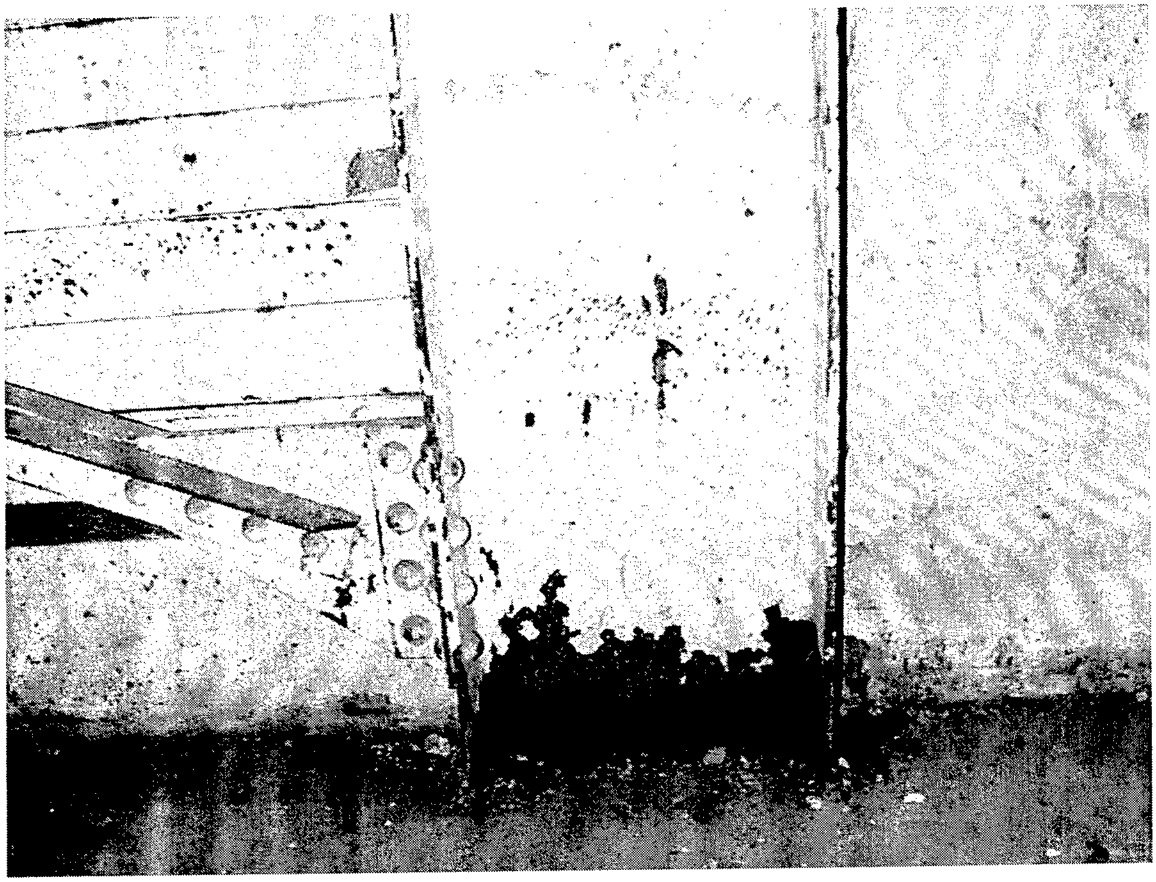

Figure A-13. Hangar 44, corrosion of column A-5.

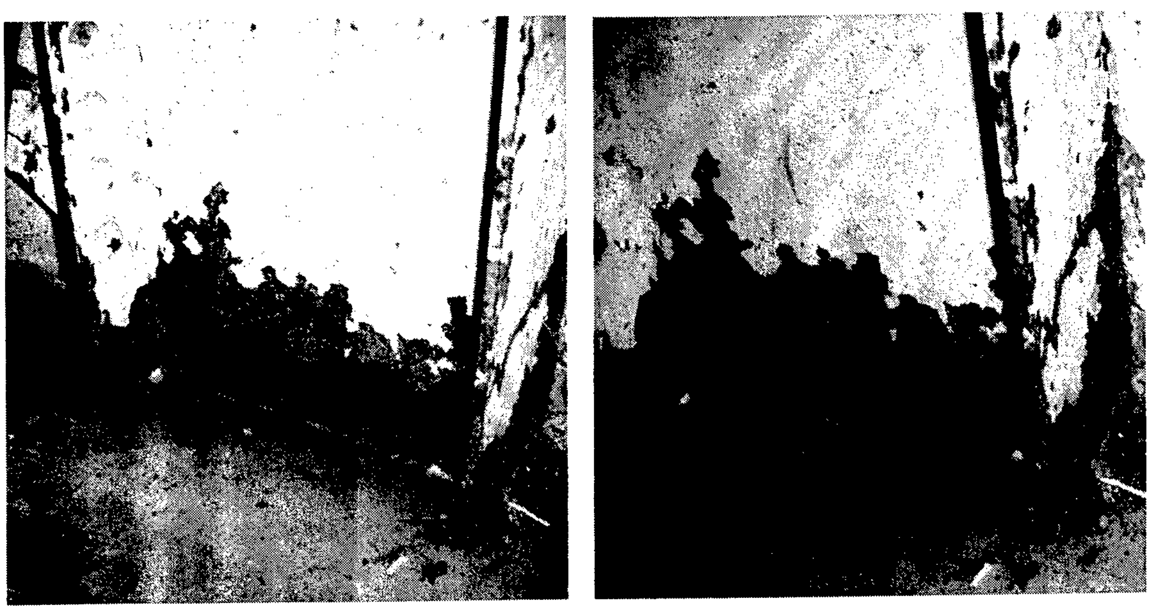

Figure A-14. Hangar 44, corrosion in N-1 column base.

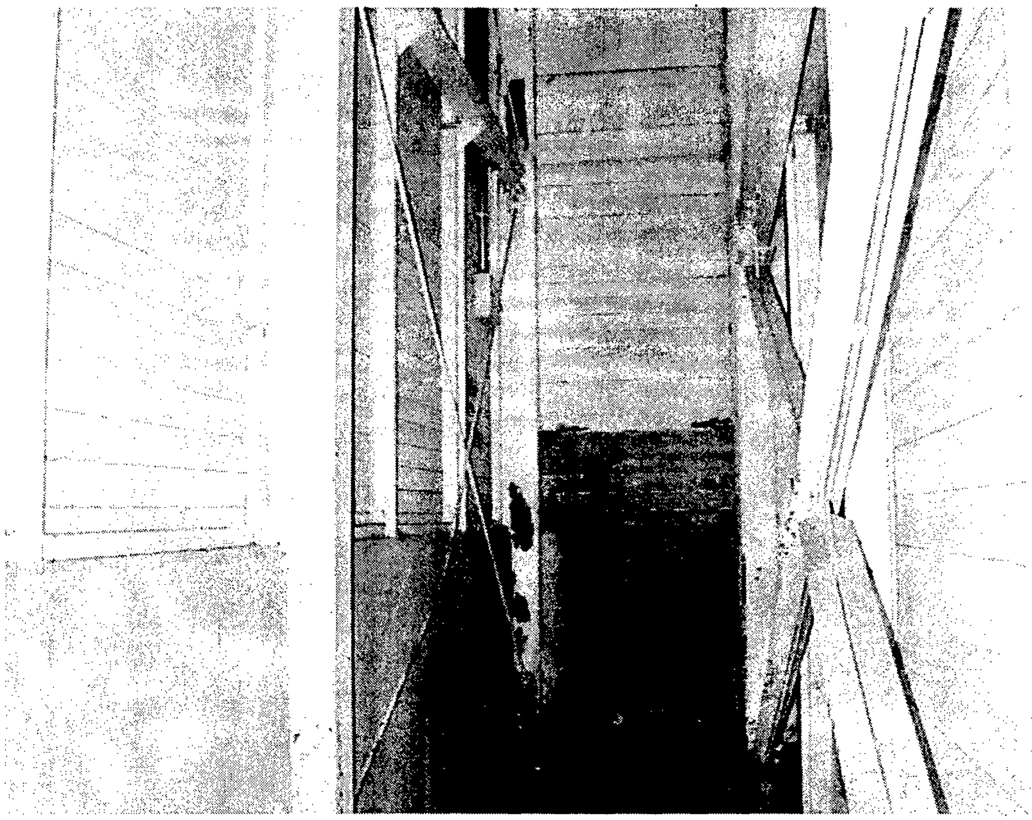

Figure A-15. Hangar 45, one bent bracing rod and one loose rod.

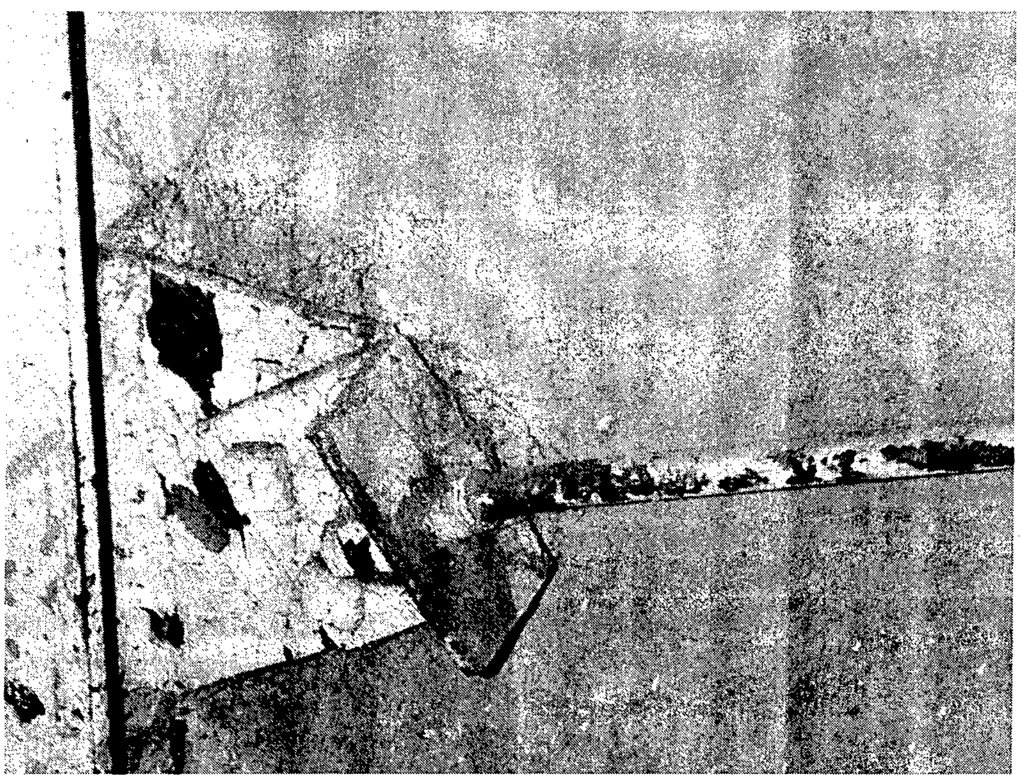

Figure A-16. Hangar 45, bottom connection of a loose rod.

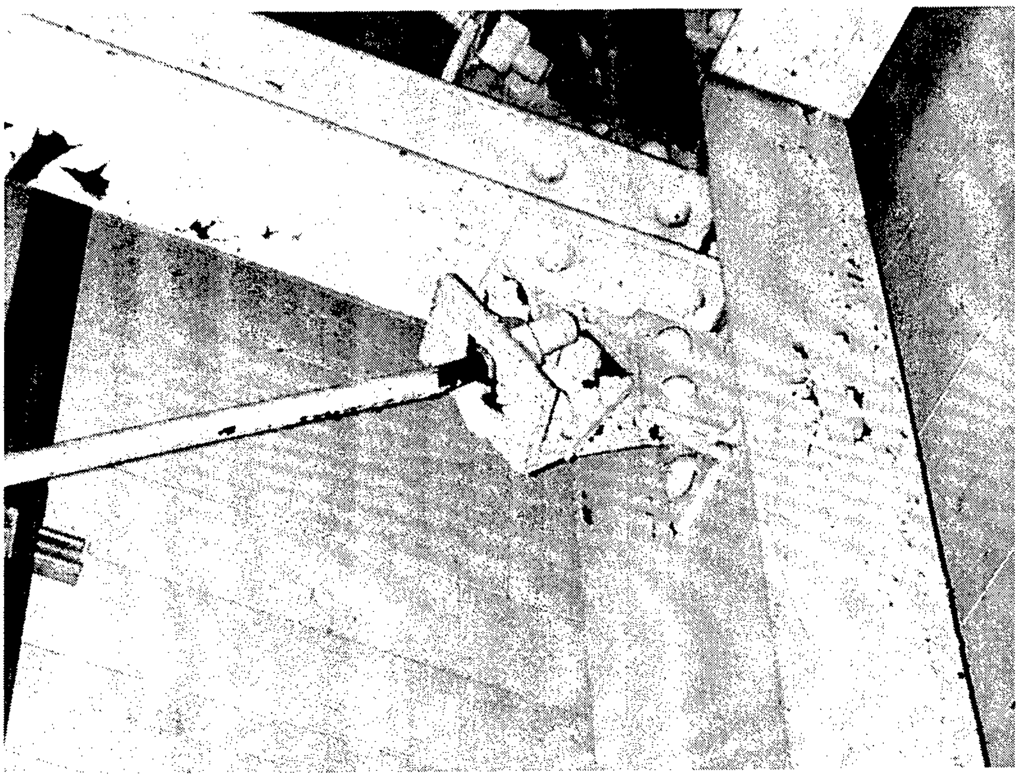

Figure A-17. Hangar 45, top connection of a loose rod.

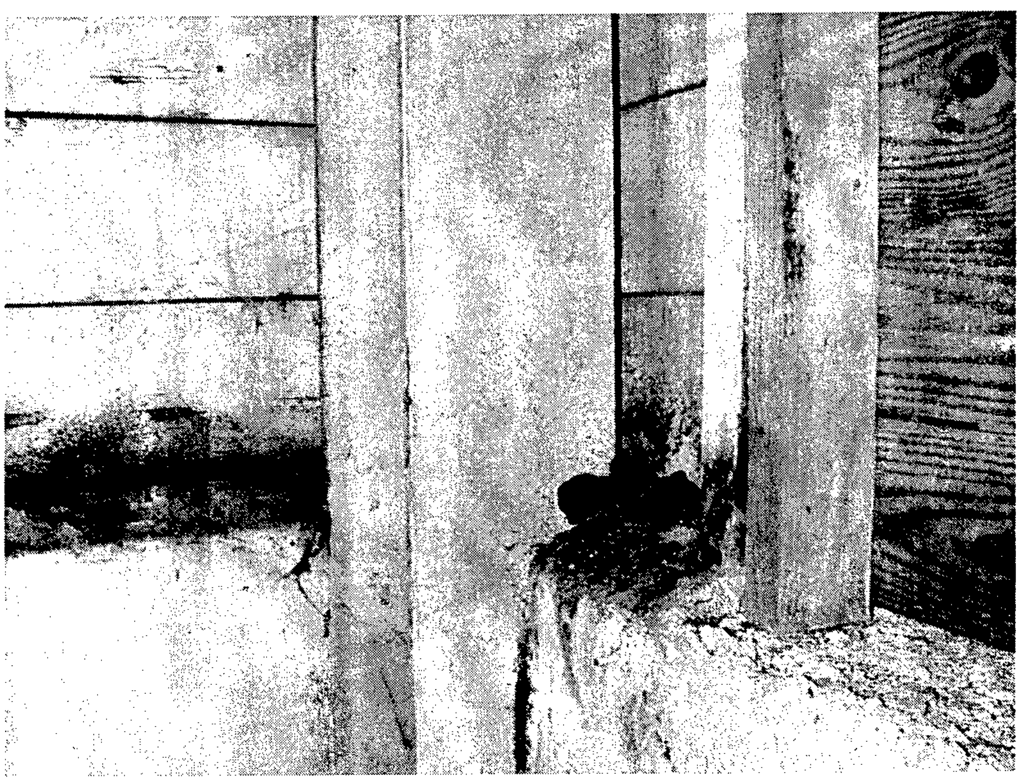

Figure A-18. Hangar 47, split in flange from corrosion in column N-½.

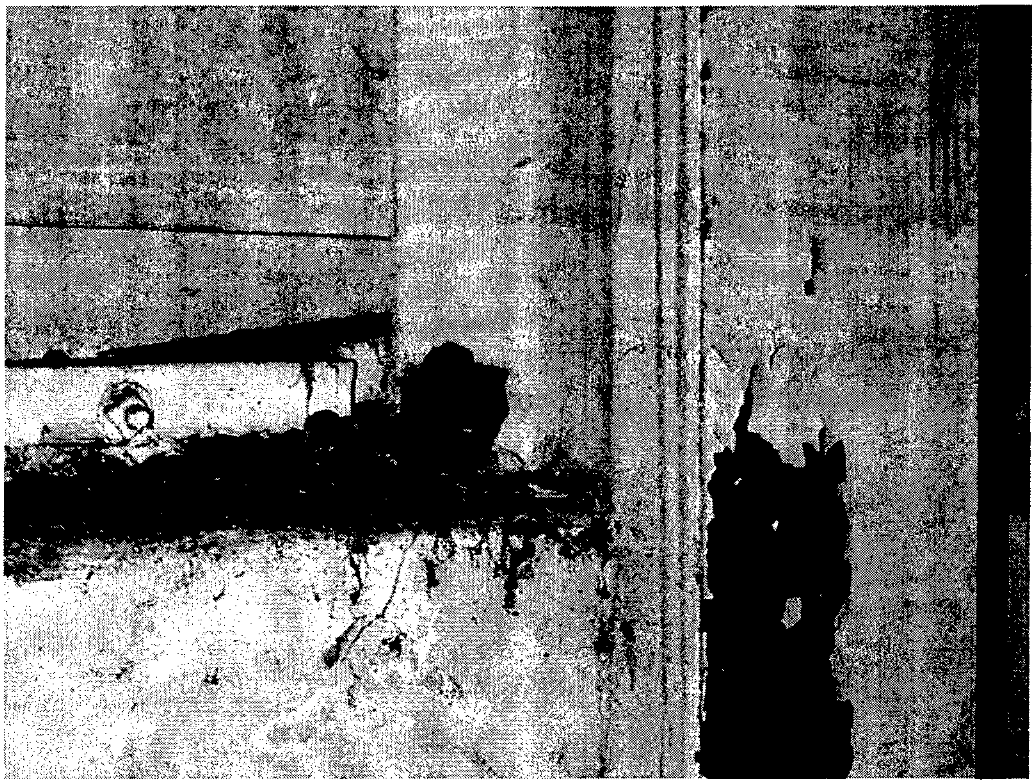

Figure A-19. Hangar 47, column P-5½.

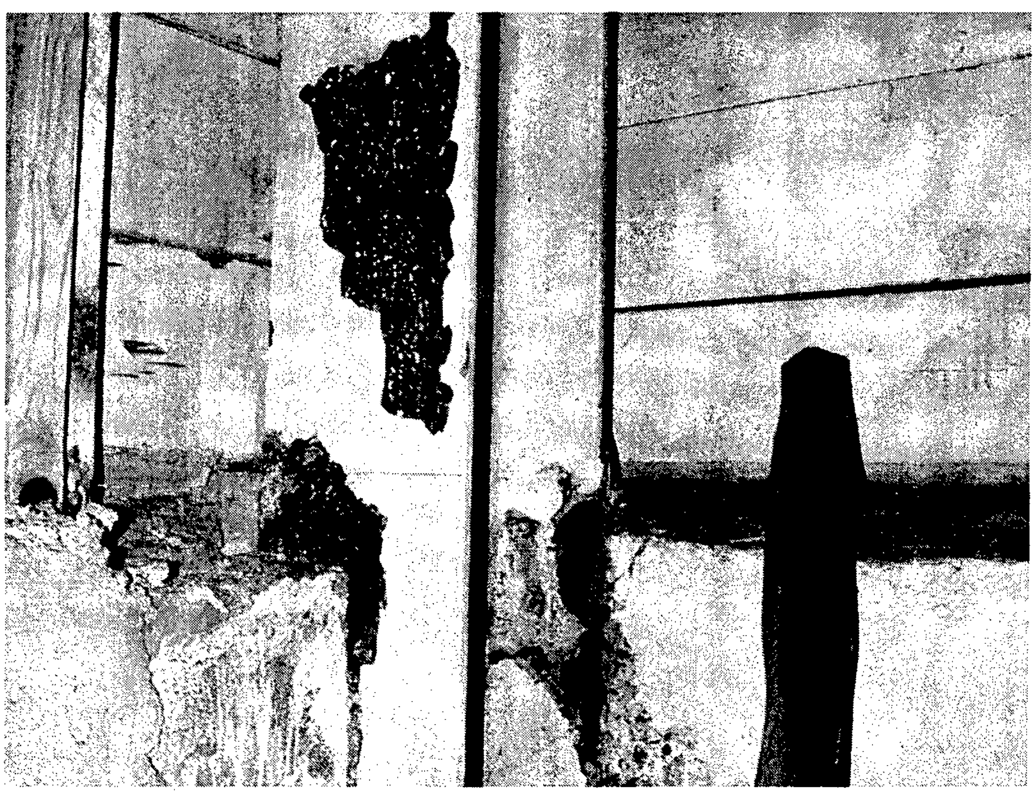

Figure A-20. Hangar 47, corroded column A-½.

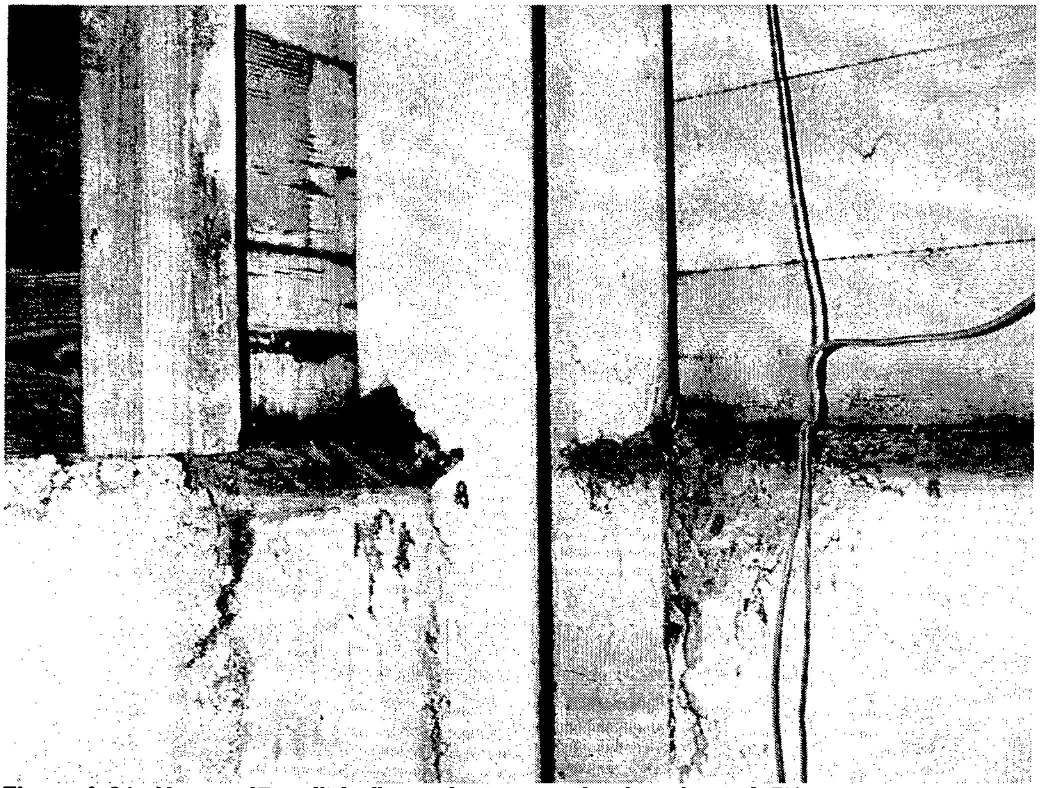

Figure A-21. Hangar 47, split in flange from corrosion in column A-5½.

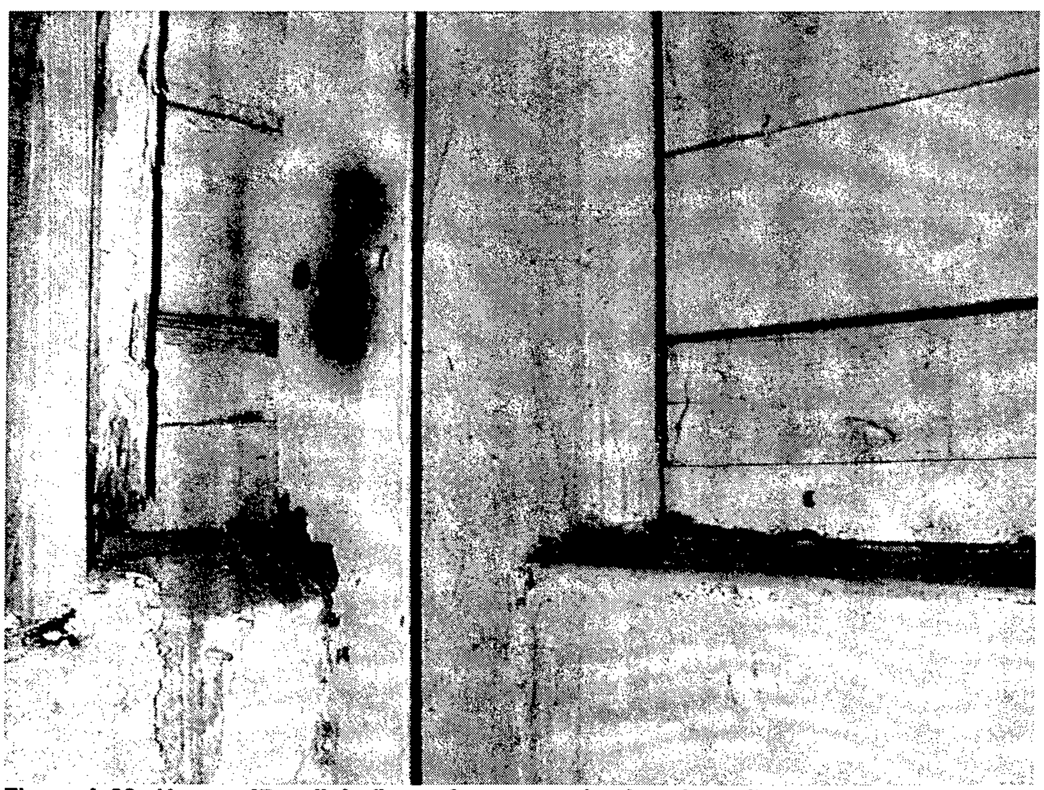

Figure A-22. Hangar 47, split in flange from corrosion in column P-½.

Appendix B: Truss Diagrams and Infill Modeling Data

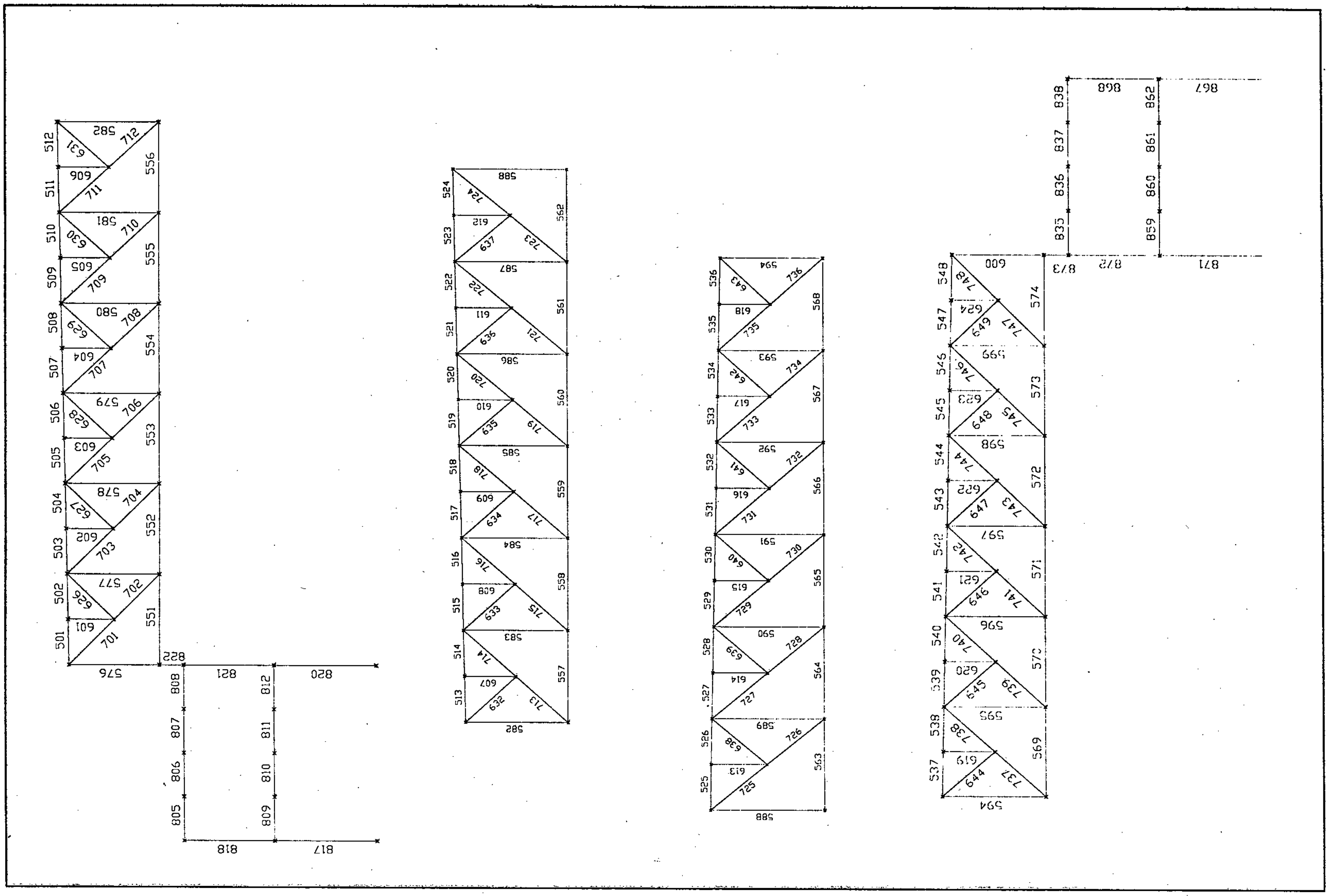

Figure B-1. CCAD, TX, element numbers for Truss T1, Hangars 43 and 47.

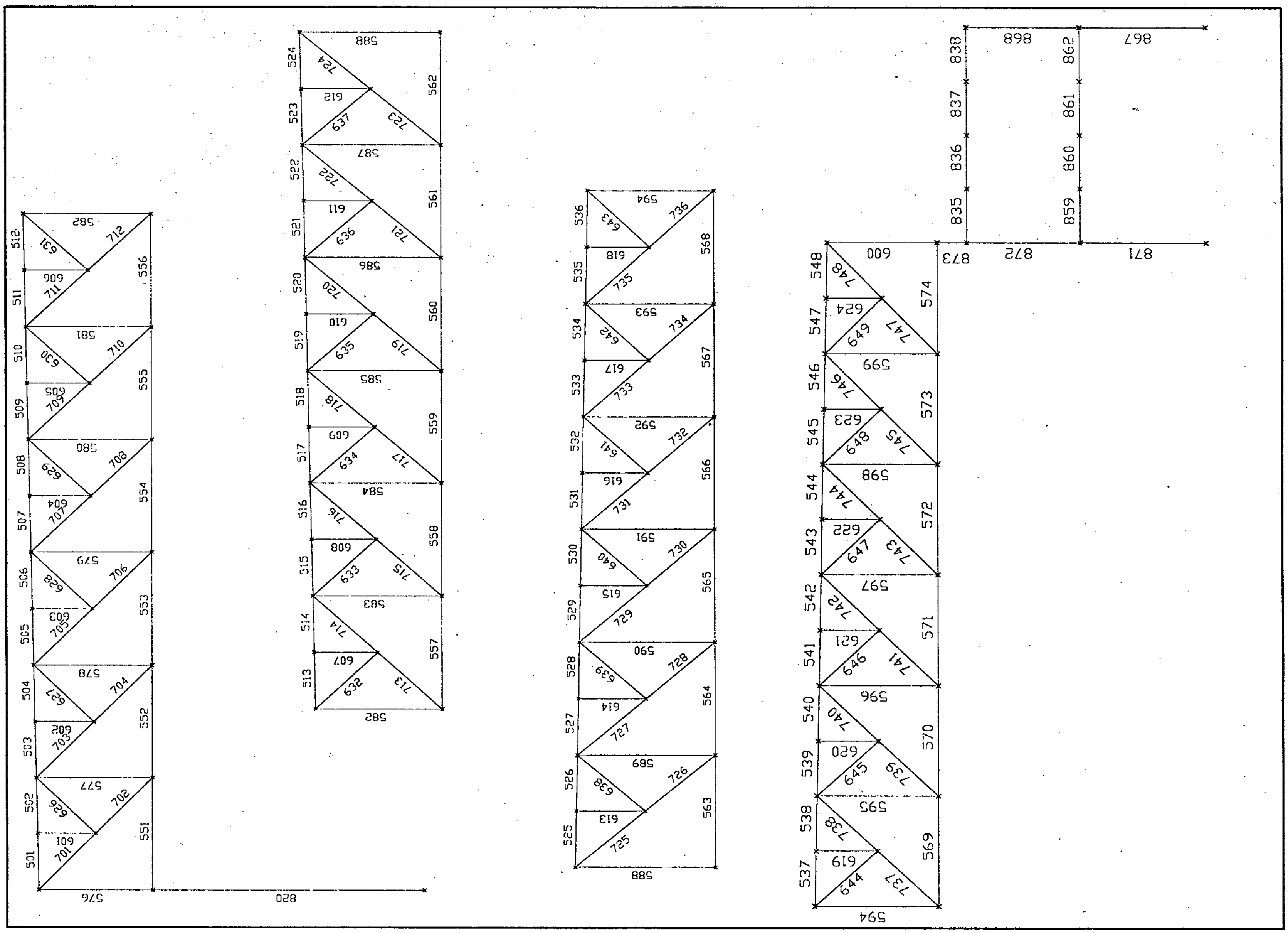

Figure B-2. CCAD, TX, element numbers for Truss T1, Hangars 44 and 45.

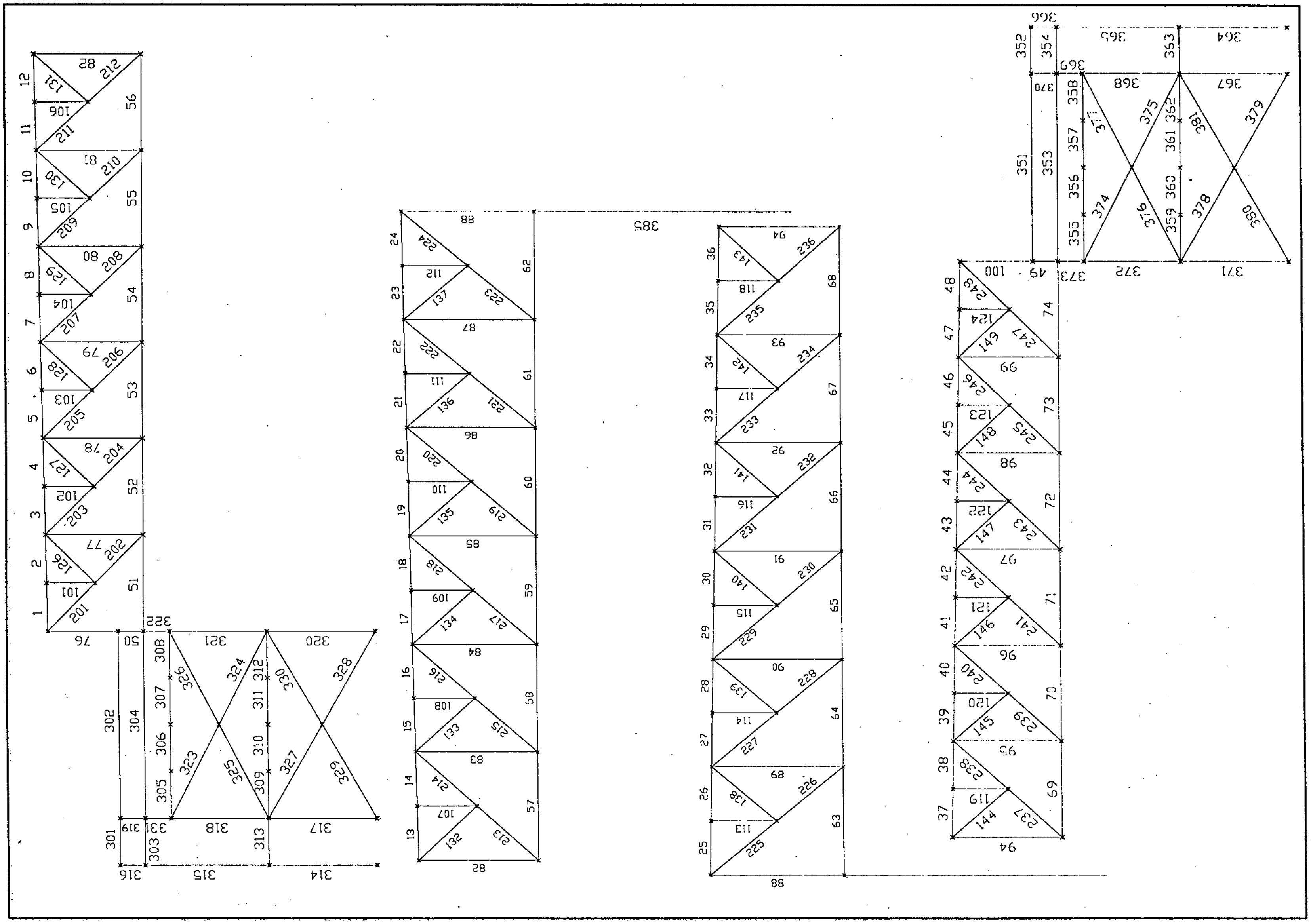

Figure B-3. CCAD, TX, element numbers for Truss T2, Hangars 43 and 47.

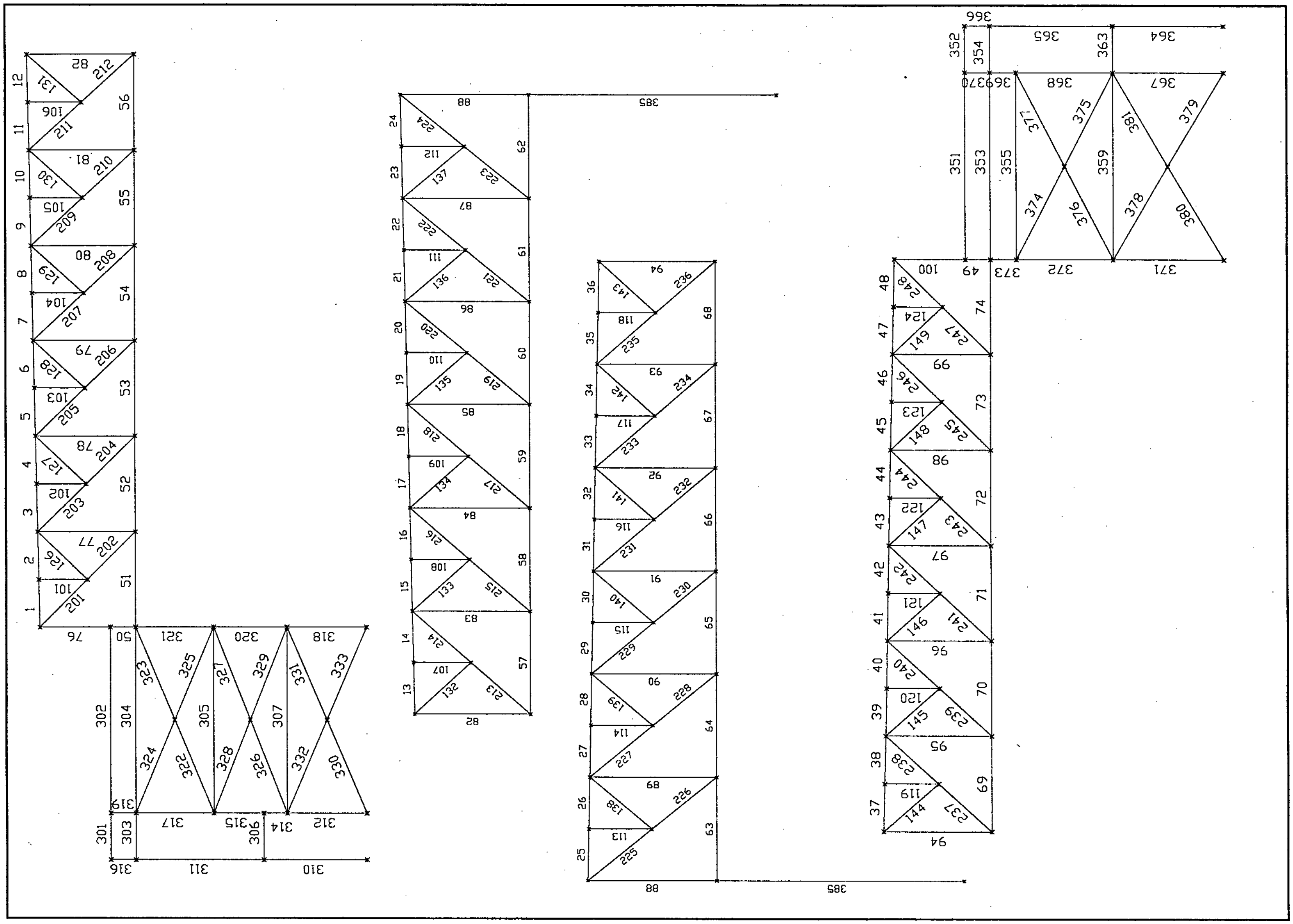

Figure B-4. CCAD, TX, element numbers for Truss T2, Hangars 44 and 45.

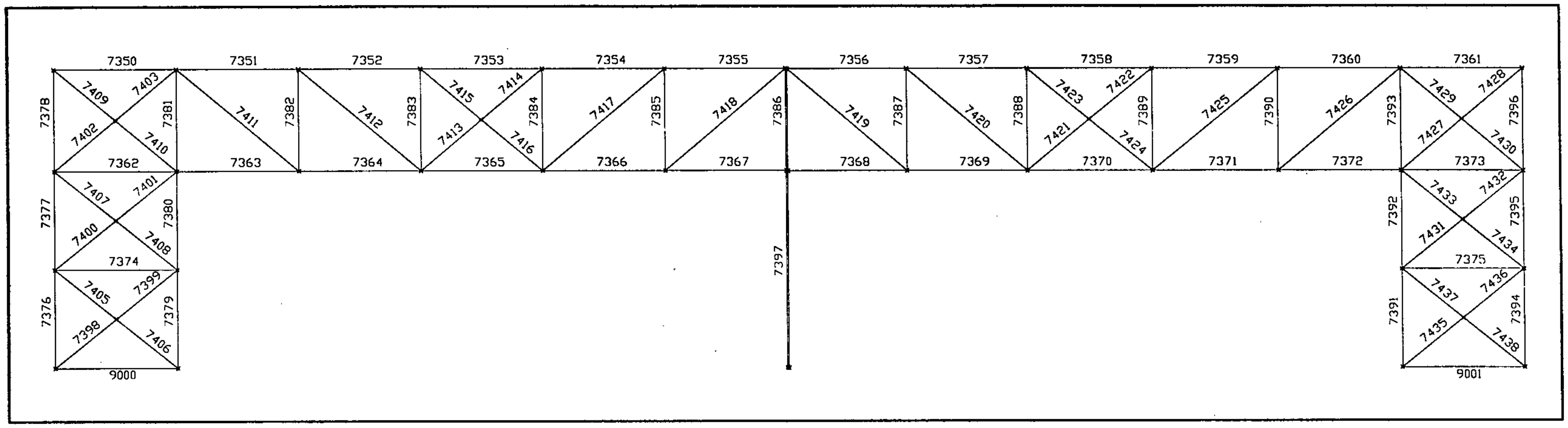

Figure B-5. CCAD, TX, element numbers for Truss T3, all hangars.

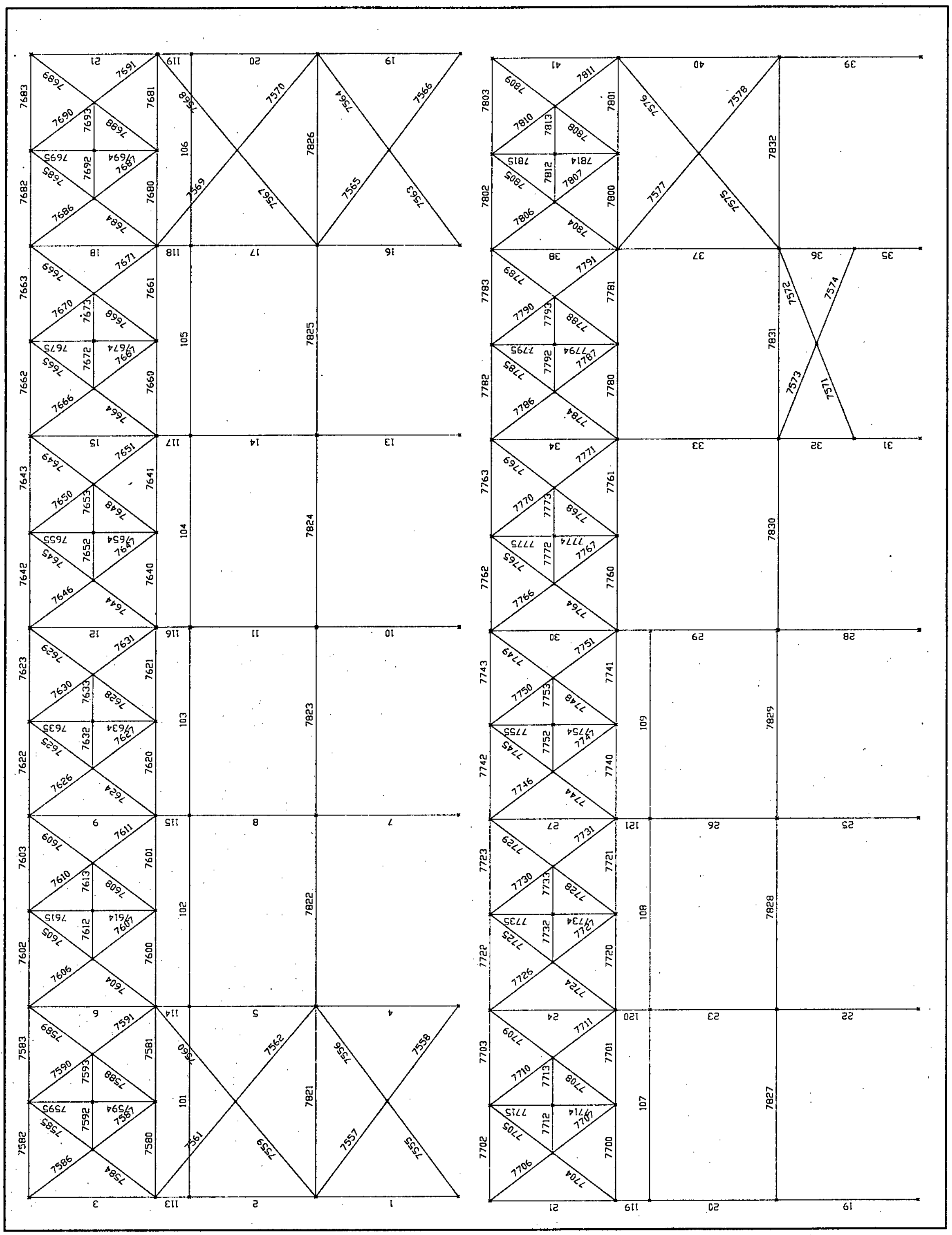

Figure B-6. CCAD, TX, element numbers for Truss SF-I, all hangars.

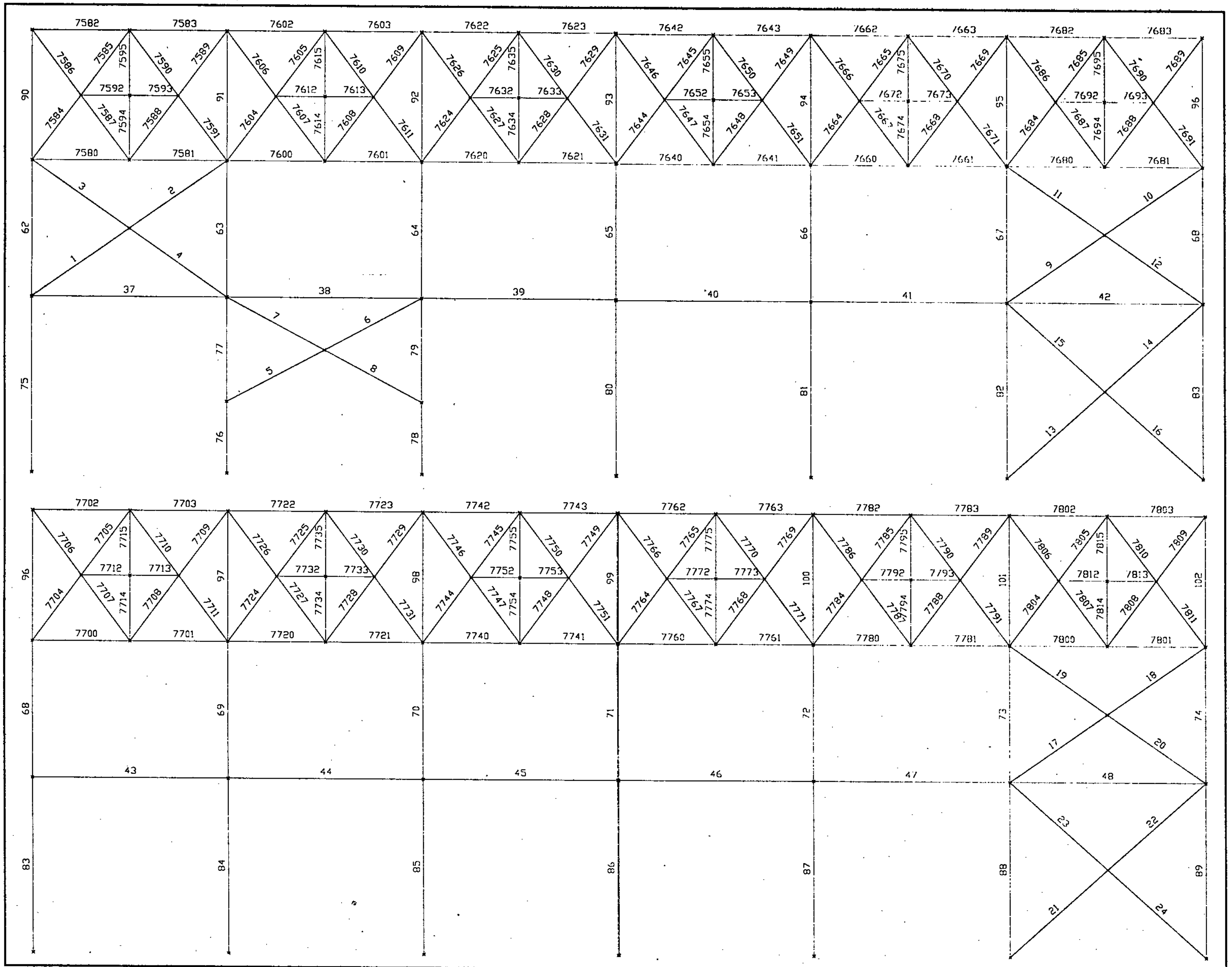

Figure B-7. CCAD, TX, element numbers for Truss SF-II, Hangars 44 and 45.

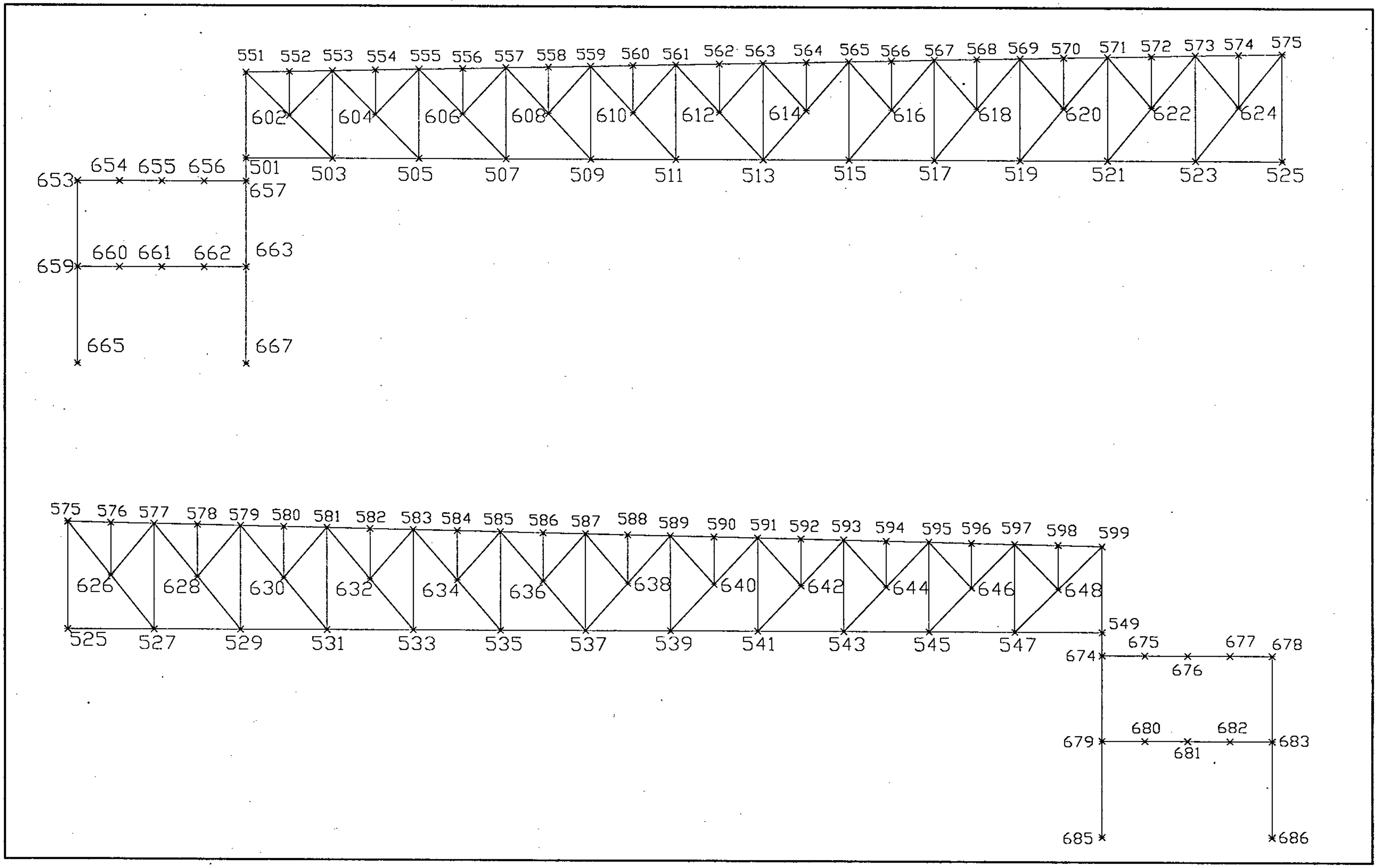

Figure B-8. CCAD, TX, joint numbers for Truss T1, Hangars 43 and 47.

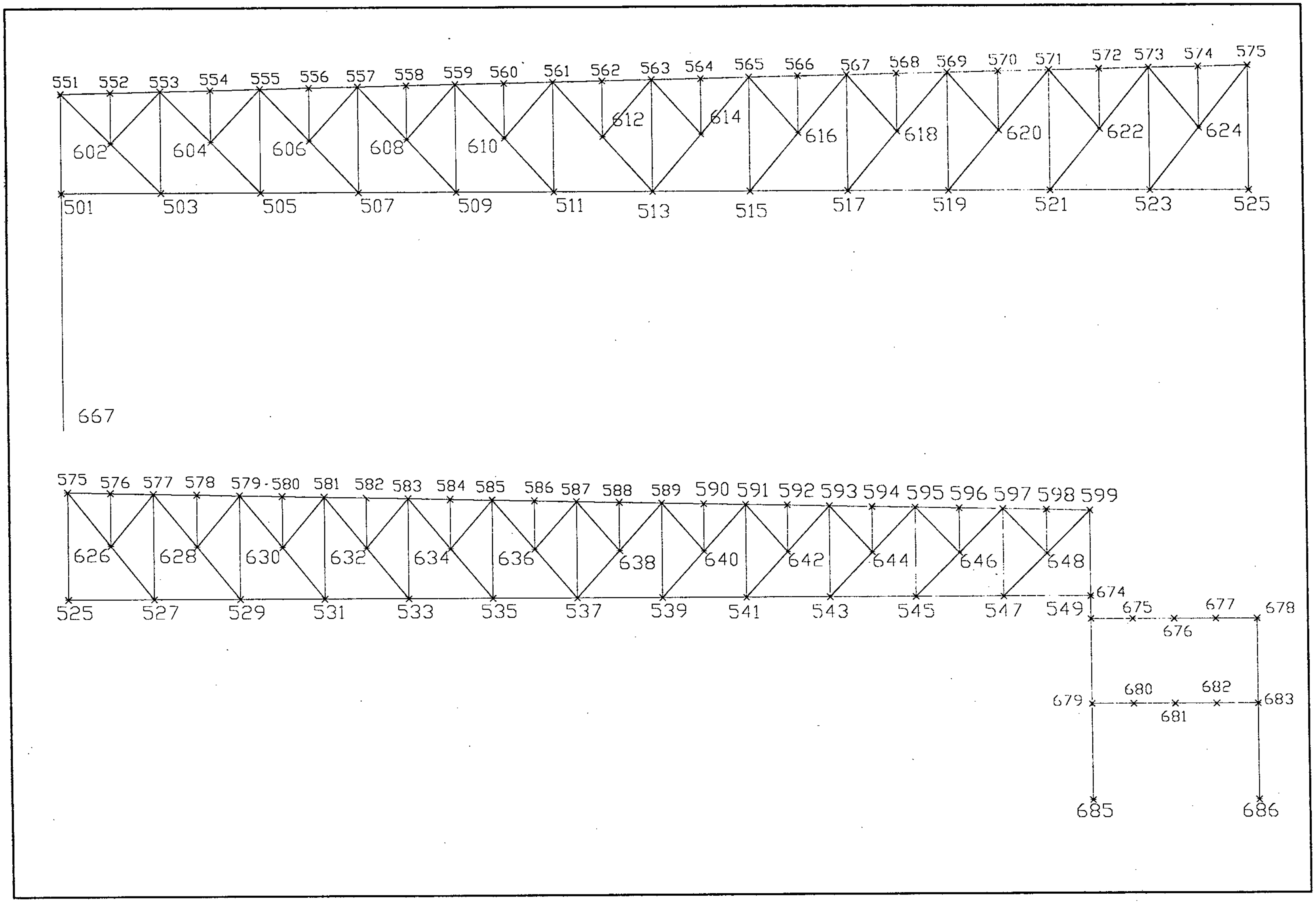

Figure B-9. CCAD, TX, joint numbers for Truss T1, Hangars 44 and 45.

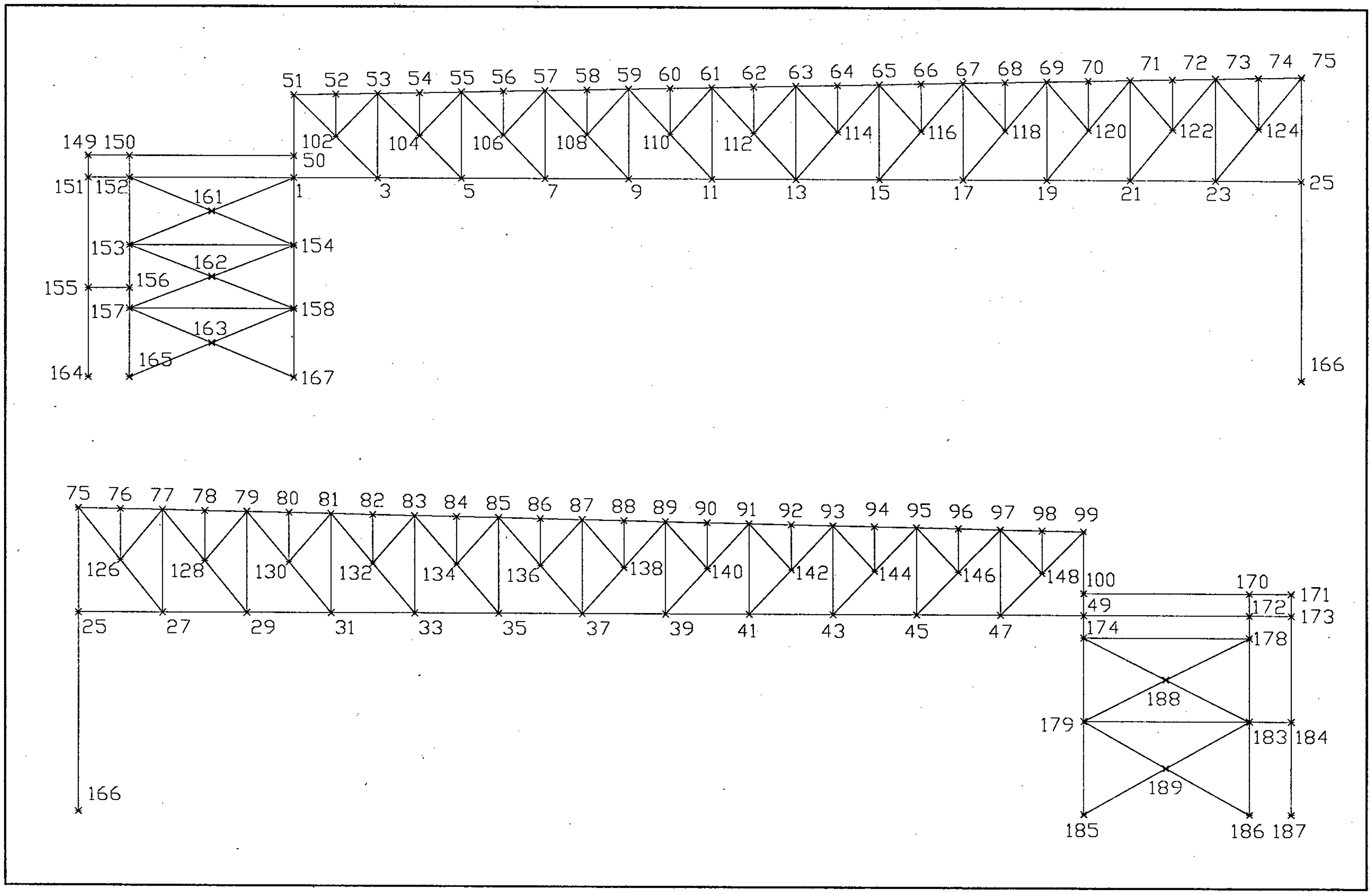

Figure B-10. CCAD, TX, joint numbers for Truss T2, Hangars 44 and 45.

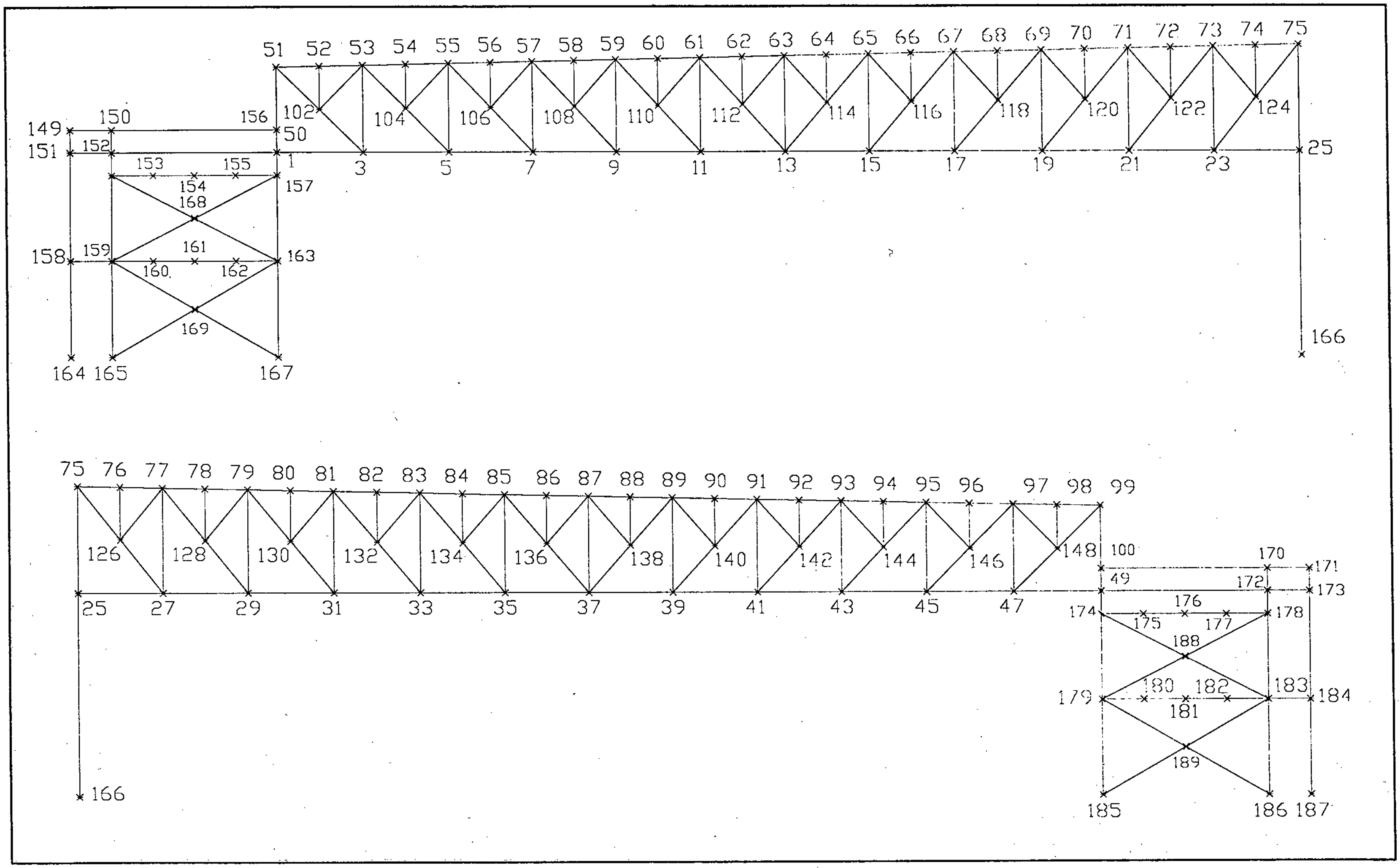

Figure B-11. CCAD, TX, joint numbers for Truss T2, Hangars 43 and 47.

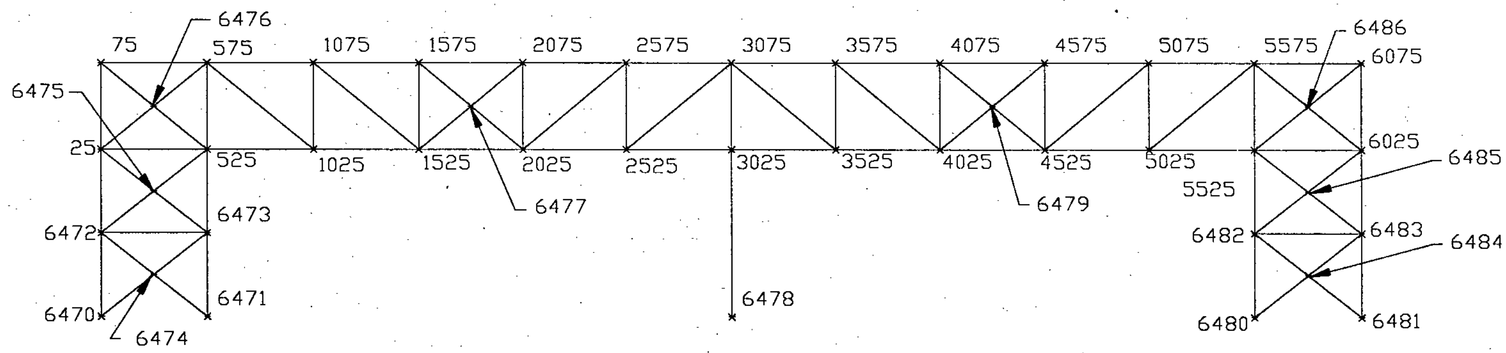

Figure B-12. CCAD, TX, joint numbers for Truss T3, all hangars.

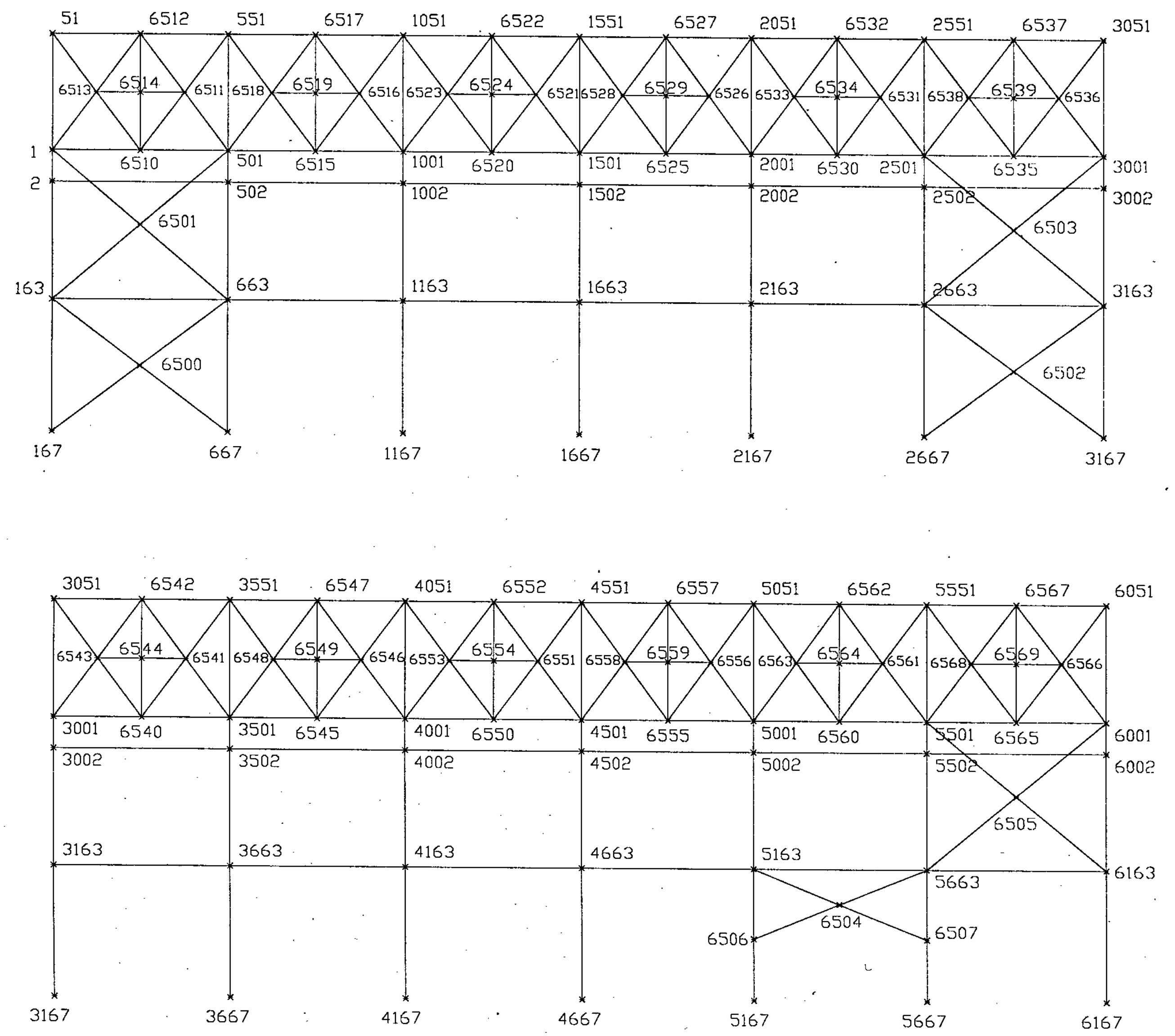

Figure B-13. CCAD, TX, joint numbers for Truss SF-I, all hangars.

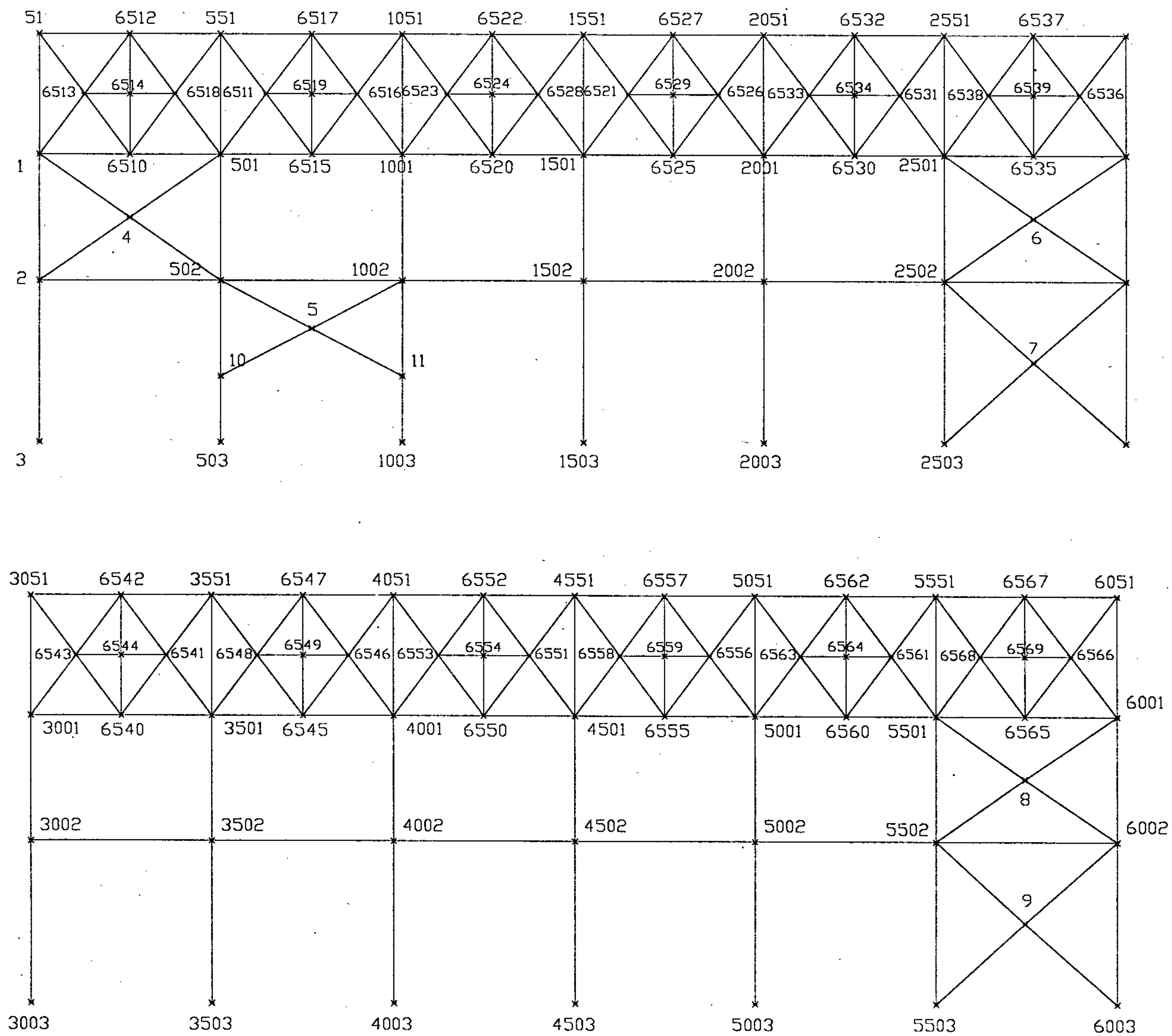

Figure B-14. CCAD, TX, joint numbers for Truss SF-II, Hangars 44 and 45.

Modeling of Infill Struts Using Al-Chaar's Idealized Method

12 Bays with Concrete Masonry Units

The height of the infill:	$H := 180.5$	in
The width of the infill:	$W := 240$	in
The height of the column:	$h := 181$	in
Length of the beam:	$L := 241$	in
Diagonal length of the infill panel	$d := \sqrt{W^2 + H^2}$	in
	$d = 300.3$	in
Effective thickness of the infill:	$t := 1.5$	in
Angle of diagonal to horizontal:	$\theta := \mathrm{atan}\left(\frac{H}{W}\right)$	
	$\theta = 0.645$	Rad
Cross-sectional area of the column:	$Ac := 25.3$	in^2
Moment of inertia of the column:	$Ic := 175$	in^4
Moment of inertia of the beam:	$Ib := 281$	in^4
Elastic modulus of the frame:	$Ef := 29000$	ksi
Elastic modulus of infill panel:	$Ei := 1531$	ksi

Relative stiffness parameter of infill and frame:

$$\lambda c := \sqrt[4]{\frac{Ei \cdot t \cdot \sin(2 \cdot \theta)}{4 \cdot Ef \cdot Ic \cdot h}} \qquad \lambda c = 0.028$$

$$\lambda b := \sqrt[4]{\frac{Ei \cdot t \cdot \sin(2 \cdot \theta)}{4 \cdot Ef \cdot Ib \cdot h}} \qquad \lambda c = 0.028$$

$$\lambda := \left(\sqrt{\lambda c^2 + \lambda b^2}\right) \cdot \cos\left(\theta - \frac{\pi}{4}\right) \qquad \lambda = 0.037$$

The Unadjusted Width of Diagonal Strut

$\lambda \cdot h = 6.673$

$wo := if\left[\lambda \cdot h < 13, \left[0.0005 \cdot (\lambda \cdot h)^2 - 0.0143 \cdot (\lambda \cdot h) + 0.2534\right] \cdot d, (-0.0013 \cdot \lambda \cdot h + 0.167) \cdot d\right]$

$wo = 54.1$

Bay Factor for number of bays:

$x := 10$

$\eta := 1$

Modes of Failure factors

Prism and Shear Strength Ratio Factor:

Prism Strength: $fm := 3387$ $\psi := \dfrac{fm}{W \cdot t}$

Shear Strength $fv := 134$ $v := \dfrac{fv}{x \cdot H \cdot t}$

$\dfrac{\psi}{v} = 190.1$ < 36

$R\_str := 1.00$

Strain energy from tension in the windward column:

$\varepsilon\_col := \dfrac{h \cdot \tan(2 \cdot \theta)}{Ac \cdot Ef}$

$\varepsilon\_col = 0.0009$ in/k

Strain energy from compression in equivalent strut:

$\varepsilon\_strut := \dfrac{d}{wo \cdot t \cdot Ei \cdot \cos(2 \cdot \theta)}$

$\varepsilon\_strut = 0.00871$ in/k

$\dfrac{\varepsilon\_strut}{\varepsilon\_col} = 10.193$

Srain factor: if x > or equal 2

and: $\frac{\varepsilon\_strut}{\varepsilon\_col} = 10.193$ > 3.5

$R\_\varepsilon := 1.05$

Otherwise: $R\_\varepsilon := 1.05$

The Adjusted Width of Diagonal Strut

$w := 0.48 \cdot \eta \cdot wo \cdot R\_str \cdot R\_\varepsilon$

$w = 27.3$ in

Area of Strut:

$A\_strut := t \cdot w$

$A\_strut = 40.9$ in^2

Appendix C: SAP90 Structural Analysis Data for Existing Trusses and Math Cad Modeling Results

c SAP90 INPUT

```
system
L=14
C
C
C
joints
2     x=0 y=0    z=-43
6002  x=0 y=2880 z=-43 g=2,6002,500
51    x=0 y=0    z=160
6051  x=0 y=2880 z=160  g=51,6051,500
1     x=0 y=0    z=0
6001  x=0 y=2880 z=0    g=1,6001,500
163   x=0 y=0    z=-203.5
6163  x=0 y=2880 z=-203.5 g=163,6163,500
167   x=0 y=0    z=-384
6167  x=0 y=2880 z=-384   g=167,6167,500
C Joints for Sway Frames
6500  x=0 y=120  z=-293.75
6501  x=0 y=120  z=-101.75
6502  x=0 y=1320 z=-293.75
6503  x=0 y=1320 z=-101.75
6504  x=0 y=2520 z=-251.75
6505  x=0 y=2760 z=-101.75
6506  x=0 y=2400 z=-300
6507  x=0 y=2640 z=-300
6510  x=0 y=120  z=0
6565  x=0 y=2760 z=0       g=6510,6565,5
6511  x=0 y=180  z=80
6566  x=0 y=2820 z=80      g=6511,6566,5
6512  x=0 y=120  z=160
6567  x=0 y=2760 z=160     g=6512,6567,5
6513  x=0 y=60   z=80
6568  x=0 y=2700 z=80      g=6513,6568,5
6514  x=0 y=120  z=80
6569  x=0 y=2760 z=80      g=6514,6569,5

restraints
167 6167 500 r=1,1,1,0,0,0
163 6163 500 r=1,0,0,0,0,0
1   6001 500 r=1,0,0,0,0,0
51  6051 500 r=1,0,0,0,0,0

frame
nm=56 nl=0 z=-1,0,0,0,0,0,0,0,0,0,0,0,0,0
1  sh=w18x76            w=.006333  E=29000
2  a=40.9 e=1531
3  sh=w12x35            w=.00248333 E=29000
4  sh=15x3x5/16         w=.0011
5  sh=213x3x1/4-3       w=.00081667
6  sh=216x3.5x5/16-3    w=.0016333
7  sh=213x3x5/16-3      w=.00101667
8  sh=2L3.5X2.5X5/16-3  w=.001008333
```

```
9  sh=213x2.5x1/4-3     w=.00075
10 sh=213x2x5/16-3      w=.0008333
11 sh=216x6x1/2-3       w=.0030667
12 sh=218x6x1/2-3       w=.0038333
13 sh=214x3x5/16-3      w=.0012
14 sh=216x4x3/8-3       w=.00205
15 sh=215x3x1/4-3       w=.0011
16 sh=215x3.5x5/16-3    w=.00145
17 sh=w18x65           w=.00541667
18 sh=w24x68           w=.005667
19 sh=w18x46           w=.0038333
20 sh=w18x65           w=.00541667
21 sh=216x6x5/8-3       w=.0040333
22 sh=213x2.5x1/4-3     w=.00075
23 sh=w8x18            w=.0015
24 sh=w12x22           w=.0018333
25 sh=w10x22           w=.0018333
26 sh=w14x30           w=.0025
27 sh=w8x31            w=.00258333
28 sh=w12x26           w=.0021667
29 sh=w10x12           w=.001
30 sh=w10x22           w=.0018333
31 sh=14x3x1/4         w=.00048333
32 sh=13.5x2.5x1/4     w=.000408333
33 sh=215x3.5x3/8-3    w=.0017333
34 sh=w14x90           w=.0075
35 sh=w14x145          w=.01208333
36 sh=w33x201          w=.01675
37 sh=217x4x1/2        w=.00298
38 sh=w14x74           w=.0061667
39 sh=w14x43           w=.00358333
40 sh=215x3x5/16       w=.0013667
41 sh=s12x50           w=.0041667
42 sh=w14x61           w=.00508333
43 sh=w6x16            w=.001333
44 sh=213x2.5x1/4-3    w=.00075
45 sh=216x4x3/8-3      w=.00258333
46 sh=mc12x31          w=.00258333
47 sh=mc12x31          w=.00258333
48 sh=216x3.5x3/8-3    w=.00195
49 sh=215x3x5/16-3     w=.0013667
50 sh=215x5x3/8        w=.00205
51 sh=13x2.5x1/4       w=.000375
52 sh=13x2x1/4         w=.000341667
53 sh=w14x30           w=.0025
54 sh=215x3.5x5/16-3   w=.00145
55 sh=w14x34           w=.0028333
56 sh=14x3x5/16        w=.0006
C Sway Frame Elements 2 and 4
7555  167 6500 m=48 lp=-3,0 lr=1,0,0,0,0,0
7556 6500  663 m=48 lp=-3,0 lr=0,1,0,0,0,0
7557  163 6500 m=49 lp=-3,0 lr=1,0,0,0,0,0
7558 6500  667 m=49 lp=-3,0 lr=0,1,0,0,0,0
7559  163 6501 m=48 lp=-3,0 lr=1,0,0,0,0,0
7560 6501  501 m=48 lp=-3,0 lr=0,1,0,0,0,0
7561    1 6501 m=49 lp=-3,0 lr=1,0,0,0,0,0
7562 6501  663 m=49 lp=-3,0 lr=0,1,0,0,0,0
```

```
7563 2667 6502 m=4  lp=-3,0 lr=1,0,0,0,0,0
7564 6502 3163 m=4  lp=-3,0 lr=0,1,0,0,0,0
7565 2663 6502 m=4  lp=-3,0 lr=1,0,0,0,0,0
7566 6502 3167 m=4  lp=-3,0 lr=0,1,0,0,0,0
7567 2663 6503 m=4  lp=-3,0 lr=1,0,0,0,0,0
7568 6503 3001 m=4  lp=-3,0 lr=0,1,0,0,0,0
7569 2501 6503 m=4  lp=-3,0 lr=1,0,0,0,0,0
7570 6503 3163 m=4  lp=-3,0 lr=0,1,0,0,0,0
7571 6506 6504 m=49 lp=-3,0 lr=1,0,0,0,0,0
7572 6504 5663 m=49 lp=-3,0 lr=0,1,0,0,0,0
7573 5163 6504 m=48 lp=-3,0 lr=1,0,0,0,0,0
7574 6504 6507 m=48 lp=-3,0 lr=0,1,0,0,0,0
7575 5663 6505 m=49 lp=-3,0 lr=1,0,0,0,0,0
7576 6505 6001 m=49 lp=-3,0 lr=0,1,0,0,0,0
7577 5501 6505 m=48 lp=-3,0 lr=1,0,0,0,0,0
7578 6505 6163 m=48 lp=-3,0 lr=0,1,0,0,0,0
C
7580    1 6510 m=46 lp=1,0  lr=0,0,0,1,0,0
7581 6510  501 m=46 lp=1,0  lr=0,0,0,0,1,0
7600  501 6515 m=47 lp=1,0   g=9,20,500,5  lr=0,0,0,1,0,0
7601 6515 1001 m=47 lp=1,0   g=9,20,5,500  lr=0,0,0,0,1,0
7800 5501 6565 m=46 lp=1,0   lr=0,0,0,1,0,0
7801 6565 6001 m=46 lp=1,0   lr=0,0,0,0,1,0
7582   51 6512 m=50 lp=-3,0  g=1,20,500,5  lr=1,0,0,0,0,0
7583 6512  551 m=50 lp=-3,0  g=1,20,5,500  lr=0,1,0,0,0,0
7622 1051 6522 m=50 lp=-3,0  g=1,20,500,5  lr=1,0,0,0,0,0
7623 6522 1551 m=50 lp=-3,0  g=1,20,5,500  lr=0,1,0,0,0,0
7662 2051 6532 m=50 lp=-3,0  g=7,20,500,5  lr=1,0,0,0,0,0
7663 6532 2551 m=50 lp=-3,0  g=7,20,5,500  lr=0,1,0,0,0,0
7584    1 6513 m=51 lp=-3,0  g=11,20,500,5 lr=1,0,0,0,0,0
7585 6513 6512 m=51 lp=-3,0  g=11,20,5,5   lr=0,1,0,0,0,0
7586   51 6513 m=51 lp=-3,0  g=11,20,500,5 lr=1,0,0,0,0,0
7587 6513 6510 m=51 lp=-3,0  g=11,20,5,5   lr=0,1,0,0,0,0
7588 6510 6511 m=51 lp=-3,0  g=11,20,5,5   lr=1,0,0,0,0,0
7589 6511  551 m=51 lp=-3,0  g=11,20,5,500 lr=0,1,0,0,0,0
7590 6512 6511 m=51 lp=-3,0  g=11,20,5,5   lr=1,0,0,0,0,0
7591 6511  501 m=51 lp=-3,0  g=11,20,5,500 lr=0,1,0,0,0,0
7592 6513 6514 m=52 lp=-3,0  g=11,20,5,5   lr=1,1,0,0,0,0
7593 6514 6511 m=52 lp=-3,0  g=11,20,5,5   lr=1,1,0,0,0,0
7594 6510 6514 m=45 lp=2,0   g=11,20,5,5   lr=1,0,0,0,0,0
7595 6514 6512 m=45 lp=2,0   g=11,20,5,5   lr=0,1,0,0,0,0
C
7821  163  663 m=2  lp=3,0
7822  663 1163 m=3  lp=3,0
7823 1163 1663 m=53 lp=3,0
7824 1663 2163 m=3  lp=3,0
7825 2163 2663 m=3  lp=3,0
7826 2663 3163 m=2  lp=3,0
7827 3163 3663 m=3  lp=3,0
7828 3663 4163 m=3  lp=3,0
7829 4163 4663 m=3  lp=3,0
7830 4663 5163 m=53 lp=3,0
7831 5163 5663 m=2  lp=3,0
7832 5663 6163 m=2  lp=3,0
1    167   163 m=20 lp=2,0
2    163     2 m=20 lp=2,0
113    2     1 m=20 lp=2,0
```

```
3      1     51 m=20 1p=2,0
4     667    663 m=1  1p=2,0  g=8,3,500,500
5     663    502 m=1  1p=2,0  g=8,3,500,500
114   502    501 m=1  1p=2,0  g=8,1,500,500
6     501    551 m=1  1p=2,0  g=8,3,500,500
31    5167 6506 m=1  1p=2,0
32    6506 5163 m=1  1p=2,0
33    5163 5002 m=1  1p=2,0
123   5002 5001 m=1  1p=2,0
34    5001 5051 m=1  1p=2,0
35    5667 6507 m=1  1p=2,0
36    6507 5663 m=1  1p=2,0
37    5663 5502 m=1  1p=2,0
124   5502 5501 m=1  1p=2,0
38    5501 5551 m=1  1p=2,0
39    6167 6163 m=20 1p=2,0
40    6163 6002 m=20 1p=2,0
125   6002 6001 m=20 1p=2,0
41    6001 6051 m=20 1p=2,0
C
101  2      502  m=25 1p=3,0 g=11,1,500,500
C
C Struts
C
51    163 667 m=2 g=11,2,500,500
52    167 663 m=2 g=11,2,500,500

loads
51    6051 6000 1=1  f=0,0,-9.5
551   5551 500  1=1  f=0,0,-19
1               1=1  f=0,0,-1.65
501             1=1  f=0,0,-1.65
3001            1=1  f=0,0,-1.65
5501            1=1  f=0,0,-1.65
6001            1=1  f=0,0,-1.65
51    6051 500  1=1  f=0,0,-.355
1     6001 6000 1=1  f=0,0,-6.93
1     6001 6000 1=1  f=0,0,-1.2
163   6163 6000 1=1  f=0,0,-6.5
501   5501 500  1=1  f=0,0,-2.34
663   5663 500  1=1  f=0,0,-13
1     6001 6000 1=2  f=0,0,-6.4
501   5501 500  1=2  f=0,0,-12.8
51    6051 6000 1=2  f=0,0,-13
551   5551 500  1=2  f=0,0,-26
1     6001 6000 1=3  f=0,0,-12.1
501   5501 500  1=3  f=0,0,-24.2
1     6001 6000 1=3  f=0,0,-2.6
501   5501 500  1=3  f=0,0,-5.2
501   5501 500  1=4  f=0,0,-3.85
501   5501 500  1=5  f=0,0,-.61
1     6001 500  1=7  f=0,0,-3.25
51    6051 6000 1=8  f=0,0,11.7
551   5551 500  1=8  f=0,0,23.4
51    6051 6000 1=9  f=0,0,-2.4
551   5551 500  1=9  f=0,0,-4.8
51    6051 6000 1=10 f=0,0,66
```

```
551  5551 500  1=10 f=0,0,132
C
51              1=11 f=0,0,23.2
551             1=11 f=0,0,46.4
1051            1=11 f=0,0,29.6
1551            1=11 f=0,0,12.8
2051            1=11 f=0,0,4
2551 5551 500   1=11 f=0,0,-4.8
6051            1=11 f=0,0,-2.4
1               1=11 f=0,77.8,0
163             1=11 f=0,24,0
1 51 50         1=11 f=0,35,0
1551 4551 3000  1=11 f=0,30,0
6001            1=11 f=0,10.25,0
6163            1=11 f=0,8.5,0
6001 6051 50    1=11 f=0,4.5,0
C
6051            1=12 f=0,0,23.2
5551            1=12 f=0,0,46.4
5051            1=12 f=0,0,29.6
4551            1=12 f=0,0,12.8
4051            1=12 f=0,0,4
3551  551 500   1=12 f=0,0,-4.8
51              1=12 f=0,0,-2.4
6001            1=12 f=0,-74.25,0
6163            1=12 f=0,-22,0
6001 6051 50    1=12 f=0,-35,0
1551 4551 3000  1=12 f=0,-30,0
1               1=12 f=0,-10.25,0
163             1=12 f=0,-3,0
1      51 50    1=12 f=0,-4.5,0
C
51              1=13 f=0,0,76.8
551             1=13 f=0,0,153.6
1051            1=13 f=0,0,137.6
1551            1=13 f=0,0,121.8
2051            1=13 f=0,0,112.8
2551 5551 500   1=13 f=0,0,104
6051            1=13 f=0,0,52
1               1=13 f=0,-12.8,0
163             1=13 f=0,-4.7,0
1 51 50         1=13 f=0,-5.7,0
1551 4551 3000  1=13 f=0,-4.8,0
6001            1=13 f=0,110,0
6163            1=13 f=0,40.2,0
6001 6051 50    1=13 f=0,49,0
C
6051            1=14 f=0,0,76.8
5551            1=14 f=0,0,153.6
5051            1=14 f=0,0,137.6
4551            1=14 f=0,0,121.6
4051            1=14 f=0,0,112.8
3551  551 500   1=14 f=0,0,104
51              1=14 f=0,0,52
6001            1=14 f=0,12.8,0
6163            1=14 f=0,4.7,0
6001 6051 50    1=14 f=0,5.7,0
```

```
1551 4551 3000 l=14 f=0,4.8,0
1              l=14 f=0,-110,0
163            l=14 f=0,-40.2,0
1       51 50  l=14 f=0,-49,0
```

SF-Type I All Hangars Infill Struts

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,4,5,7 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,0,1,0,1,1,0,0,0,0,0,0
2 c=1,0,0,1,0,0,1,0,1,0,0,0,0,0
3 c=1,0,0,0,1,0,1,0,0,1,0,0,0,0
4 c=1,0,0,0,1,0,1,0,0,0,1,0,0,0
5 c=1,0,0,0,1,0,1,0,0,0,0,1,0,0
6 c=1,0,0,0,1,0,1,0,0,0,0,0,1,0
7 c=1,0,0,0,1,0,1,0,0,0,0,0,0,1

sections
2  mn=s sh=g e=29000 fy=36 a=11.03 i=281,49.9 \
        as=6.69,5.37 z=49.3,17.72 t=8,12.2     :C8x11.5,12-I-25
57 mn=s sh=g e=29000 fy=36 a=6.94 i=54.7,13.5 \
        as=4.5,3 z=15.2,6.75 t=8.375,6         :2Z4x3
58 mn=s sh=g e=29000 fy=36 a=7.22 i=17.5,35.6 \
        as=3.75,3.75 z=8.72,11.4 t=7.22,10.375 :2L5x5x3/8
59 mn=s sh=g e=29000 fy=36 a=7.07 i=99.4,6.07 \
        as=4.68,4.29 z=29.9,6.35 t=11.52,6.674 :C10x20,L3x2x/14
60 mn=s sh=g e=29000 fy=36 a=1.19 i=1.09,.392 \
        as=.5,.75 z=.973,.468 t=4.014,3.014    :1L3x2x1/4
61 mn=s sh=g e=29000 fy=36 a=1.31 i=1.17,.743 \
        as=.625,.75 z=1.02,.724 t=4.18,2.68    :1L3x2.5x1/4
62 mn=s sh=g e=29000 fy=36 a=2.4 i=6.26,1.75  \
        as=1.56,.94 z=3.36,1.35 t=6.64,4.64    :1L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=6.84 i=25.7,13.2 \
        as=1.31,2.25 z=11.5,4.4 t=7.92,7.375   :2L6x3.5x3/8
64 mn=s sh=g e=29000 fy=36 a=5.68 i=86.9,5.86 \
        as=4.48,2.9 z=29.4,7.53 t=21.9,6.59    :C10x15.3,1L3x2x1/4
65 mn=s sh=g e=29000 fy=36 a=11.03 i=281,49.9 \
        as=6.69,5.37 z=49.3,17.72 t=15.9,8     :C8x11.5,12-I-25
66 mn=s sh=g e=29000 fy=36 a=4.8 i=12.5,7.14  \
        as=3.1,2     z=6.71,2.7   t=6.64,6.375 :2L5x3x5/16

frame
1  28 3 l=.001,1
31 32 1 l=.001,1
35 36 1 l=.001,1
39      l=.001,1
2  40 3 l=.4,1
7821    l=1,.001
7822    m=65 l=1,.001
7823    l=1,.001
7824    m=65 l=1,.001
7825    m=65 l=1,.001
7826    l=1,.001
7827 7829 1 m=65 l=1,.001
7830 7832 1 l=1,.001
7580 7581 1 m=59
7600 7780 20 m=64
7601 7781 20 m=64
```

```
7800 7801 1 m=59
7582 7802 20 m=58
7583 7805 20 m=58
7584 7804 20 m=61
7585 7805 20 m=61
7586 7806 20 m=61
7587 7807 20 m=61
7588 7808 20 m=61
7589 7809 20 m=61
7590 7810 20 m=61
7591 7811 20 m=61
7592 7812 20 m=60
7593 7813 20 m=60
7594 7814 20 m=57
7595 7815 20 m=57
7555 7556 1  m=63
7557 7558 1  m=66
7559 7560 1  m=63
7561 7562 1  m=66
7563 7570 1  m=62
7571 7572 1  m=66
7573 7574 1  m=63
7575 7576 1  m=66
7577 7578 1  m=63
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SF-Type I All Hangars Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
1	W18X65									COMPACT
		(C)	.673	.592	.000	.082	180.50	7	(H1-1)	
31	W18X76									COMPACT
		(T)	.527	.132	.000	.395	84.00	6	(H2-1)	
32	W18X76									COMPACT
		(T)	.520	.126	.000	.395	.00	6	(H2-1)	
39	W18X65									COMPACT
		(C)	.510	.393	.000	.117	180.50	6	(H1-1)	
101	W10X22									COMPACT
		(T)	.545	.000	.545	.000	.00	7	(BENDING)	
102	W10X22									COMPACT
		(C)	.639	.189	.450	.000	240.00	4	(H1-1)	
103	W10X22									COMPACT
		(C)	.654	.254	.400	.000	240.00	4	(H1-1)	
104	W10X22									COMPACT
		(C)	.653	.289	.363	.000	240.00	4	(H1-1)	
105	W10X22									COMPACT
		(C)	.587	.287	.300	.000	240.00	4	(H1-1)	
106	W10X22									COMPACT
		(C)	.554	.369	.185	.000	.00	5	(H1-1)	
107	W10X22									COMPACT
		(C)	.751	.445	.307	.000	.00	5	(H1-1)	
108	W10X22									COMPACT
		(C)	.841	.460	.381	.000	.00	5	(H1-1)	
109	W10X22									COMPACT
		(C)	.868	.439	.430	.000	.00	5	(H1-1)	
110	W10X22									COMPACT
		(C)	.855	.387	.468	.000	.00	5	(H1-1)	
111	W10X22									COMPACT
		(C)	.843	.346	.497	.000	.00	5	(H1-1)	
		(T)	.533	.000	.533	.000	240.00	6	(BENDING)	
112	W10X22									COMPACT
		(C)	.503	.151	.353	.000	.00	5	(H1-1)	
		(T)	.549	.000	.549	.000	240.00	6	(BENDING)	
113	W18X65									COMPACT
		(C)	.523	.073	.000	.451	.00	7	(H1-3)	
124	W18X76									COMPACT
		(T)	.525	.169	.000	.356	.00	6	(H2-1)	
125	W18X65									COMPACT
		(C)	.561	.058	.000	.502	.00	6	(H1-3)	
7555	G									NON-COM
		(C)	.542	.496	.046	.000	150.15	7	(H1-1)	
7556	G									NON-COM
		(C)	.556	.490	.067	.000	.00	7	(H1-1)	
7557	G									NON-COM
		(C)	1.070	.981	.089	.000	75.08	4	(H1-1)	
		(T)	.591	.509	.082	.000	150.15	7	(H2-1)	
7558	G									NON-COM
		(C)	1.057	.991	.066	.000	75.08	4	(H1-1)	
		(T)	.559	.504	.055	.000	.00	7	(H2-1)	

SF-Type I All Hangars Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7559	G									NON-COM
		(C)	.772	.734	.039	.000	78.67	7	(H1-1)	
7560	G									NON-COM
		(C)	.790	.728	.062	.000	.00	7	(H1-1)	
7561	G			fa > Fe						NON-COM
7562	G			fa > Fe						NON-COM
7563	G									NON-COM
		(C)	.805	.737	.068	.000	150.15	5	(H1-1)	
7564	G									NON-COM
		(C)	.784	.709	.075	.000	.00	5	(H1-1)	
7565	G									NON-COM
		(C)	.843	.768	.075	.000	150.15	4	(H1-1)	
7566	G									NON-COM
		(C)	.863	.796	.068	.000	.00	4	(H1-1)	
7567	G									NON-COM
		(C)	7.129	3.520	3.608	.000	157.33	5	(H1-1)	
		(T)	.670	.608	.062	.000	157.33	4	(H2-1)	
7568	G									NON-COM
		(C)	5.935	3.492	2.443	.000	.00	5	(H1-1)	
		(T)	.678	.613	.065	.000	.00	4	(H2-1)	
7569	G									NON-COM
		(C)	5.373	3.463	1.910	.000	157.33	4	(H1-1)	
		(T)	.683	.621	.062	.000	157.33	5	(H2-1)	
7570	G									NON-COM
		(C)	5.957	3.492	2.465	.000	.00	4	(H1-1)	
		(T)	.676	.615	.061	.000	.00	5	(H2-1)	
7575	G									NON-COM
		(C)	8.413	1.734	6.679	.000	157.33	5	(H1-1)	
		(T)	.855	.825	.030	.000	78.67	6	(H2-1)	
7576	G									NON-COM
		(C)	3.460	1.722	1.738	.000	.00	5	(H1-1)	
		(T)	.886	.829	.057	.000	.00	6	(H2-1)	
7580	G									NON-COM
		(C)	1.251	.752	.000	.499	120.00	4	(H1-1)	
		(T)	.643	.527	.000	.116	120.00	7	(H2-1)	
7581	G									NON-COM
		(C)	1.260	.765	.000	.495	.00	4	(H1-1)	
		(T)	.628	.523	.000	.105	.00	7	(H2-1)	
7600	G									NON-COM
		(C)	.735	.556	.000	.179	120.00	5	(H1-1)	
7601	G									NON-COM
		(C)	.708	.437	.000	.272	.00	5	(H1-1)	
7604	G									NON-COM
		(C)	.817	.761	.056	.000	100.00	5	(H1-1)	
7605	G									NON-COM
		(C)	.666	.625	.040	.000	.00	5	(H1-1)	
7606	G									NON-COM
		(C)	.741	.709	.032	.000	50.00	4	(H1-1)	
7607	G									NON-COM
		(C)	.692	.659	.033	.000	.00	4	(H1-1)	

SF-Type I All Hangars Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7608	G									NON-COM
		(C)	.594	.553	.041	.000	100.00	5	(H1-1)	
7609	G									NON-COM
		(C)	.715	.677	.038	.000	.00	5	(H1-1)	
7610	G									NON-COM
		(C)	.800	.761	.038	.000	100.00	4	(H1-1)	
7611	G									NON-COM
		(C)	.878	.824	.054	.000	.00	4	(H1-1)	
7624	G									NON-COM
		(C)	.621	.579	.042	.000	100.00	5	(H1-1)	
7629	G									NON-COM
		(C)	.536	.508	.028	.000	.00	5	(H1-1)	
7631	G									NON-COM
		(C)	.583	.541	.041	.000	.00	4	(H1-1)	
7640	G									NON-COM
		(C)	.543	.342	.000	.201	120.00	4	(H1-1)	
7641	G									NON-COM
		(C)	.565	.421	.000	.144	.00	4	(H1-1)	
7646	G									NON-COM
		(C)	.576	.551	.025	.000	50.00	4	(H1-1)	
7651	G									NON-COM
		(C)	.683	.637	.047	.000	.00	4	(H1-1)	
7660	G									NON-COM
		(C)	.744	.477	.000	.267	120.00	4	(H1-1)	
7661	G									NON-COM
		(C)	.760	.568	.000	.192	.00	4	(H1-1)	
7664	G									NON-COM
		(C)	.557	.523	.033	.000	100.00	5	(H1-1)	
7666	G									NON-COM
		(C)	.642	.613	.029	.000	100.00	4	(H1-1)	
7670	G									NON-COM
		(C)	.561	.529	.032	.000	100.00	4	(H1-1)	
7671	G									NON-COM
		(C)	.761	.709	.052	.000	.00	4	(H1-1)	
7700	G									NON-COM
		(C)	.943	.676	.000	.267	120.00	5	(H1-1)	
		(T)	.565	.418	.000	.148	120.00	6	(H2-1)	
7701	G									NON-COM
		(C)	.930	.591	.000	.339	.00	5	(H1-1)	
		(T)	.506	.392	.000	.114	.00	6	(H2-1)	
7704	G									NON-COM
		(C)	.742	.687	.055	.000	100.00	5	(H1-1)	
7705	G									NON-COM
		(C)	.525	.493	.032	.000	.00	5	(H1-1)	
7709	G									NON-COM
		(C)	.634	.605	.029	.000	.00	5	(H1-1)	
7711	G									NON-COM
		(C)	.508	.479	.029	.000	.00	4	(H1-1)	

SF-Type I All Hangars Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7720	G									NON-COM
		(C)	.753	.549	.000	.205	120.00	5	(H1-1)	
		(T)	.521	.380	.000	.141	120.00	6	(H2-1)	
7721	G									NON-COM
		(C)	.743	.494	.000	.249	.00	5	(H1-1)	
7724	G									NON-COM
		(C)	.598	.552	.045	.000	100.00	5	(H1-1)	
7740	G									NON-COM
		(C)	.645	.480	.000	.165	120.00	5	(H1-1)	
		(T)	.517	.376	.000	.141	120.00	6	(H2-1)	
7741	G									NON-COM
		(C)	.630	.412	.000	.217	.00	5	(H1-1)	
7744	G									NON-COM
		(C)	.666	.620	.047	.000	100.00	5	(H1-1)	
7749	G									NON-COM
		(C)	.557	.532	.026	.000	50.00	5	(H1-1)	
7760	G									NON-COM
		(C)	.574	.415	.000	.159	120.00	5	(H1-1)	
		(T)	.532	.384	.000	.148	120.00	6	(H2-1)	
7761	G									NON-COM
		(C)	.551	.339	.000	.212	.00	5	(H1-1)	
7764	G									NON-COM
		(C)	.574	.531	.043	.000	100.00	5	(H1-1)	
7771	G									NON-COM
		(C)	.555	.519	.037	.000	.00	4	(H1-1)	
7780	G									NON-COM
		(C)	.526	.317	.000	.209	120.00	4	(H1-1)	
		(T)	.547	.383	.000	.164	120.00	6	(H2-1)	
7781	G									NON-COM
		(C)	.555	.411	.000	.144	.00	4	(H1-1)	
7784	G									NON-COM
		(C)	.760	.709	.051	.000	100.00	5	(H1-1)	
7785	G									NON-COM
		(C)	.656	.623	.033	.000	.00	5	(H1-1)	
7786	G									NON-COM
		(C)	.577	.542	.035	.000	100.00	4	(H1-1)	
7788	G									NON-COM
		(C)	.555	.523	.031	.000	100.00	5	(H1-1)	
7789	G									NON-COM
		(C)	.626	.598	.028	.000	50.00	5	(H1-1)	
7790	G									NON-COM
		(C)	.538	.503	.035	.000	100.00	4	(H1-1)	
7791	G									NON-COM
		(C)	.667	.623	.044	.000	.00	4	(H1-1)	
7800	G									NON-COM
		(C)	1.249	.765	.000	.484	120.00	5	(H1-1)	
		(T)	.593	.493	.000	.100	120.00	6	(H2-1)	
7801	G									NON-COM
		(C)	1.237	.744	.000	.493	.00	5	(H1-1)	
		(T)	.670	.524	.000	.146	.00	6	(H2-1)	

c **SAP90 INPUT**

```
system
L=14
C
C
C
joints
2      x=0 y=0    z=-43
6002   x=0 y=2880 z=-43 g=2,6002,500
51     x=0 y=0    z=160
6051   x=0 y=2880 z=160   g=51,6051,500
1      x=0 y=0    z=0
6001   x=0 y=2880 z=0     g=1,6001,500
163    x=0 y=0    z=-203.5
6163   x=0 y=2880 z=-203.5 g=163,6163,500
167    x=0 y=0    z=-384
6167   x=0 y=2880 z=-384   g=167,6167,500
C Joints for Sway Frames
6500   x=0 y=120  z=-293.75
6501   x=0 y=120  z=-101.75
6502   x=0 y=1320 z=-293.75
6503   x=0 y=1320 z=-101.75
6504   x=0 y=2520 z=-251.75
6505   x=0 y=2760 z=-101.75
6506   x=0 y=2400 z=-300
6507   x=0 y=2640 z=-300
6510   x=0 y=120  z=0
6565   x=0 y=2760 z=0        g=6510,6565,5
6511   x=0 y=180  z=80
6566   x=0 y=2820 z=80       g=6511,6566,5
6512   x=0 y=120  z=160
6567   x=0 y=2760 z=160      g=6512,6567,5
6513   x=0 y=60   z=80
6568   x=0 y=2700 z=80       g=6513,6568,5
6514   x=0 y=120  z=80
6569   x=0 y=2760 z=80       g=6514,6569,5

restraints
167 6167 500 r=1,1,1,0,0,0
163 6163 500 r=1,0,0,0,0,0
1   6001 500 r=1,0,0,0,0,0
51  6051 500 r=1,0,0,0,0,0

frame
nm=56 nl=0 z=-1,0,0,0,0,0,0,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333   E=29000
2  a=40.9 e=1531
3  sh=w12x35              w=.00248333 E=29000
4  sh=15x3x5/16           w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
```

```
9  sh=213x2.5x1/4-3      w=.00075
10 sh=213x2x5/16-3       w=.0008333
11 sh=216x6x1/2-3        w=.0030667
12 sh=218x6x1/2-3        w=.0038333
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=216x4x3/8-3        w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
C Sway Frame Elements 2 and 4
7555  167 6500 m=48 lp=-3,0 lr=1,0,0,0,0,0
7556 6500  663 m=48 lp=-3,0 lr=0,1,0,0,0,0
7557  163 6500 m=49 lp=-3,0 lr=1,0,0,0,0,0
7558 6500  667 m=49 lp=-3,0 lr=0,1,0,0,0,0
7559  163 6501 m=48 lp=-3,0 lr=1,0,0,0,0,0
7560 6501  501 m=48 lp=-3,0 lr=0,1,0,0,0,0
7561    1 6501 m=49 lp=-3,0 lr=1,0,0,0,0,0
7562 6501  663 m=49 lp=-3,0 lr=0,1,0,0,0,0
```

```
7563 2667 6502 m=4  lp=-3,0 lr=1,0,0,0,0,0
7564 6502 3163 m=4  lp=-3,0 lr=0,1,0,0,0,0
7565 2663 6502 m=4  lp=-3,0 lr=1,0,0,0,0,0
7566 6502 3167 m=4  lp=-3,0 lr=0,1,0,0,0,0
7567 2663 6503 m=4  lp=-3,0 lr=1,0,0,0,0,0
7568 6503 3001 m=4  lp=-3,0 lr=0,1,0,0,0,0
7569 2501 6503 m=4  lp=-3,0 lr=1,0,0,0,0,0
7570 6503 3163 m=4  lp=-3,0 lr=0,1,0,0,0,0
7571 6506 6504 m=49  lp=-3,0 lr=1,0,0,0,0,0
7572 6504 5663 m=49  lp=-3,0 lr=0,1,0,0,0,0
7573 5163 6504 m=48  lp=-3,0 lr=1,0,0,0,0,0
7574 6504 6507 m=48  lp=-3,0 lr=0,1,0,0,0,0
7575 5663 6505 m=49  lp=-3,0 lr=1,0,0,0,0,0
7576 6505 6001 m=49  lp=-3,0 lr=0,1,0,0,0,0
7577 5501 6505 m=48  lp=-3,0 lr=1,0,0,0,0,0
7578 6505 6163 m=48  lp=-3,0 lr=0,1,0,0,0,0
C
7580    1 6510 m=46 lp=1,0  lr=0,0,0,1,0,0
7581 6510  501 m=46 lp=1,0  lr=0,0,0,0,1,0
7600  501 6515 m=47 lp=1,0   g=9,20,500,5  lr=0,0,0,1,0,0
7601 6515 1001 m=47 lp=1,0   g=9,20,5,500  lr=0,0,0,0,1,0
7800 5501 6565 m=46 lp=1,0   lr=0,0,0,1,0,0
7801 6565 6001 m=46 lp=1,0   lr=0,0,0,0,1,0
7582   51 6512 m=50 lp=-3,0  g=1,20,500,5  lr=1,0,0,0,0,0
7583 6512  551 m=50 lp=-3,0  g=1,20,5,500  lr=0,1,0,0,0,0
7622 1051 6522 m=50 lp=-3,0  g=1,20,500,5  lr=1,0,0,0,0,0
7623 6522 1551 m=50 lp=-3,0  g=1,20,5,500  lr=0,1,0,0,0,0
7662 2051 6532 m=50 lp=-3,0  g=7,20,500,5  lr=1,0,0,0,0,0
7663 6532 2551 m=50 lp=-3,0  g=7,20,5,500  lr=0,1,0,0,0,0
7584    1 6513 m=51 lp=-3,0  g=11,20,500,5 lr=1,0,0,0,0,0
7585 6513 6512 m=51 lp=-3,0  g=11,20,5,5   lr=0,1,0,0,0,0
7586   51 6513 m=51 lp=-3,0  g=11,20,500,5 lr=1,0,0,0,0,0
7587 6513 6510 m=51 lp=-3,0  g=11,20,5,5   lr=0,1,0,0,0,0
7588 6510 6511 m=51 lp=-3,0  g=11,20,5,5   lr=1,0,0,0,0,0
7589 6511  551 m=51 lp=-3,0  g=11,20,5,500 lr=0,1,0,0,0,0
7590 6512 6511 m=51 lp=-3,0  g=11,20,5,5   lr=1,0,0,0,0,0
7591 6511  501 m=51 lp=-3,0  g=11,20,5,500 lr=0,1,0,0,0,0
7592 6513 6514 m=52 lp=-3,0  g=11,20,5,5   lr=1,1,0,0,0,0
7593 6514 6511 m=52 lp=-3,0  g=11,20,5,5   lr=1,1,0,0,0,0
7594 6510 6514 m=45 lp=2,0   g=11,20,5,5   lr=1,0,0,0,0,0
7595 6514 6512 m=45 lp=2,0   g=11,20,5,5   lr=0,1,0,0,0,0
C
7821  163  663 m=2  lp=3,0
7822  663 1163 m=3  lp=3,0
7823 1163 1663 m=53 lp=3,0
7824 1663 2163 m=3  lp=3,0
7825 2163 2663 m=3  lp=3,0
7826 2663 3163 m=2  lp=3,0
7827 3163 3663 m=3  lp=3,0
7828 3663 4163 m=3  lp=3,0
7829 4163 4663 m=3  lp=3,0
7830 4663 5163 m=53 lp=3,0
7831 5163 5663 m=2  lp=3,0
7832 5663 6163 m=2  lp=3,0
1    167   163 m=20 lp=2,0
2    163     2 m=20 lp=2,0
113    2     1 m=20 lp=2,0
```

```
3       1     51 m=20 lp=2,0
4     667    663 m=1  lp=2,0  g=8,3,500,500
5     663    502 m=1  lp=2,0  g=8,3,500,500
114   502    501 m=1  lp=2,0  g=8,1,500,500
6     501    551 m=1  lp=2,0  g=8,3,500,500
31    5167 6506 m=1   lp=2,0
32    6506 5163 m=1   lp=2,0
33    5163 5002 m=1   lp=2,0
123   5002 5001 m=1   lp=2,0
34    5001 5051 m=1   lp=2,0
35    5667 6507 m=1   lp=2,0
36    6507 5663 m=1   lp=2,0
37    5663 5502 m=1   lp=2,0
124   5502 5501 m=1   lp=2,0
38    5501 5551 m=1   lp=2,0
39    6167 6163 m=20  lp=2,0
40    6163 6002 m=20  lp=2,0
125   6002 6001 m=20  lp=2,0
41    6001 6051 m=20  lp=2,0
c
101   2    502  m=25  lp=3,0 g=11,1,500,500

loads
51    6051 6000 l=1   f=0,0,-9.5
551   5551 500  l=1   f=0,0,-19
1               l=1   f=0,0,-1.65
501             l=1   f=0,0,-1.65
3001            l=1   f=0,0,-1.65
5501            l=1   f=0,0,-1.65
6001            l=1   f=0,0,-1.65
51    6051 500  l=1   f=0,0,-.355
1     6001 6000 l=1   f=0,0,-6.93
1     6001 6000 l=1   f=0,0,-1.2
163   6163 6000 l=1   f=0,0,-6.5
501   5501 500  l=1   f=0,0,-2.34
663   5663 500  l=1   f=0,0,-13
1     6001 6000 l=2   f=0,0,-6.4
501   5501 500  l=2   f=0,0,-12.8
51    6051 6000 l=2   f=0,0,-13
551   5551 500  l=2   f=0,0,-26
1     6001 6000 l=3   f=0,0,-12.1
501   5501 500  l=3   f=0,0,-24.2
1     6001 6000 l=3   f=0,0,-2.6
501   5501 500  l=3   f=0,0,-5.2
501   5501 500  l=4   f=0,0,-3.85
501   5501 500  l=5   f=0,0,-.61
1     6001 500  l=7   f=0,0,-3.25
51    6051 6000 l=8   f=0,0,11.7
551   5551 500  l=8   f=0,0,23.4
51    6051 6000 l=9   f=0,0,-2.4
551   5551 500  l=9   f=0,0,-4.8
51    6051 6000 l=10  f=0,0,66
551   5551 500  l=10  f=0,0,132
c
51              l=11  f=0,0,23.2
551             l=11  f=0,0,46.4
1051            l=11  f=0,0,29.6
```

```
1551            l=11 f=0,0,12.8
2051            l=11 f=0,0,4
2551 5551 500   l=11 f=0,0,-4.8
6051            l=11 f=0,0,-2.4
1               l=11 f=0,77.8,0
163             l=11 f=0,24,0
1 51 50         l=11 f=0,35,0
1551 4551 3000  l=11 f=0,30,0
6001            l=11 f=0,10.25,0
6163            l=11 f=0,8.5,0
6001 6051 50    l=11 f=0,4.5,0
C
6051            l=12 f=0,0,23.2
5551            l=12 f=0,0,46.4
5051            l=12 f=0,0,29.6
4551            l=12 f=0,0,12.8
4051            l=12 f=0,0,4
3551  551 500   l=12 f=0,0,-4.8
51              l=12 f=0,0,-2.4
6001            l=12 f=0,-74.25,0
6163            l=12 f=0,-22,0
6001 6051 50    l=12 f=0,-35,0
1551 4551 3000  l=12 f=0,-30,0
1               l=12 f=0,-10.25,0
163             l=12 f=0,-3,0
1      51 50    l=12 f=0,-4.5,0
C
51              l=13 f=0,0,76.8
551             l=13 f=0,0,153.6
1051            l=13 f=0,0,137.6
1551            l=13 f=0,0,121.8
2051            l=13 f=0,0,112.8
2551 5551 500   l=13 f=0,0,104
6051            l=13 f=0,0,52
1               l=13 f=0,-12.8,0
163             l=13 f=0,-4.7,0
1 51 50         l=13 f=0,-5.7,0
1551 4551 3000  l=13 f=0,-4.8,0
6001            l=13 f=0,110,0
6163            l=13 f=0,40.2,0
6001 6051 50    l=13 f=0,49,0
C
6051            l=14 f=0,0,76.8
5551            l=14 f=0,0,153.6
5051            l=14 f=0,0,137.6
4551            l=14 f=0,0,121.6
4051            l=14 f=0,0,112.8
3551  551 500   l=14 f=0,0,104
51              l=14 f=0,0,52
6001            l=14 f=0,12.8,0
6163            l=14 f=0,4.7,0
6001 6051 50    l=14 f=0,5.7,0
1551 4551 3000  l=14 f=0,4.8,0
1               l=14 f=0,-110,0
163             l=14 f=0,-40.2,0
1      51 50    l=14 f=0,-49,0
```

SF-Type I Hangars 43, 44, 45 and 47   No Infill Struts

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,4,5,7 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,0,1,0,1,1,0,0,0,0,0,0
2 c=1,0,0,1,0,0,1,0,1,0,0,0,0,0
3 c=1,0,0,0,1,0,1,0,0,1,0,0,0,0
4 c=1,0,0,0,1,0,1,0,0,0,1,0,0,0
5 c=1,0,0,0,1,0,1,0,0,0,0,1,0,0
6 c=1,0,0,0,1,0,1,0,0,0,0,0,1,0
7 c=1,0,0,0,1,0,1,0,0,0,0,0,0,1

sections
57 mn=s sh=g e=29000 fy=36 a=6.94 i=54.7,13.5 \
        as=4.5,3 z=15.2,6.75 t=6,8.375          :2Z4x3
58 mn=s sh=g e=29000 fy=36 a=7.22 i=17.5,35.6 \
        as=3.75,3.75 z=8.72,11.4 t=10.4,5       :2L5x5x3/8
59 mn=s sh=g e=29000 fy=36 a=7.07 i=99.4,6.07 \
        as=4.68,4.29 z=29.9,6.35 t=5.7,10       :C10x20,L3x2x/14
60 mn=s sh=g e=29000 fy=36 a=1.19 i=1.09,.392 \
        as=.5,.75 z=.973,.468 t=2,3             :1L3x2x1/4
61 mn=s sh=g e=29000 fy=36 a=1.31 i=1.17,.743 \
        as=.625,.75 z=1.02,.724 t=2.5,3.0       :1L3x.5x1/4
62 mn=s sh=g e=29000 fy=36 a=2.4 i=6.26,1.75  \
        as=1.56,.94 z=3.36,1.35 t=3,5           :1L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=3.42 i=12.9,3.34 \
        as=1.31,2.25 z=5.76,2.2 t=3.5,6         :1L6x3.5x3/8
64 mn=s sh=g e=29000 fy=36 a=5.68 i=86.9,5.86 \
        as=4.48,2.9 z=29.4,7.53 t=5.6,10        :C10x15.3,1L3x2x1/4
65 mn=s sh=g e=29000 fy=36 a=11.03 i=281,49.9 \
        as=6.69,5.37 z=49.3,17.72 t=8,12.2      :C8x11.5,12-I-25

frame
1   28 3 l=.001,1
31  32 1 l=.001,1
35  36 1 l=.001,1
39       l=.001,1
2   40 3 l=.4,1
7821     l=1,.001
7822     m=65 l=1,.001
7823     l=1,.001
7824     m=65 l=1,.001
7825     m=65 l=1,.001
7826     l=1,.001
7827 7829 1 m=65 l=1,.001
7830 7832 1 l=1,.001
7580 7581 1 m=59
7600 7780 20 m=64
7601 7781 20 m=64
7800 7801 1 m=59
7582 7802 20 m=58
7583 7805 20 m=58
7584 7804 20 m=61
```

7585	7805	20	m=61
7586	7806	20	m=61
7587	7807	20	m=61
7588	7808	20	m=61
7589	7809	20	m=61
7590	7810	20	m=61
7591	7811	20	m=61
7592	7812	20	m=60
7593	7813	20	m=60
7594	7814	20	m=57
7595	7815	20	m=57
7555	7556	1	m=63
7557	7558	1	m=62
7559	7560	1	m=63
7561	7562	1	m=62
7563	7570	1	m=62
7571	7572	1	m=62
7573	7574	1	m=63
7575	7576	1	m=62
7577	7578	1	m=63

SF Type I Hangars 43, 44, 45 and 47 Retrofit: None
No Infill Struts

SF-Type I All Hangars No Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
1	W18X65									COMPACT
		(C)	.844	.728	.000	.116	180.50	5	(H1-1)	
2	W18X65									COMPACT
		(C)	.708	.467	.000	.241	160.50	5	(H1-1)	
31	W18X76									COMPACT
		(C)	1.116	.059	.000	1.058	84.00	5	(H1-3)	
		(T)	1.260	.146	.000	1.115	84.00	6	(H2-1)	
32	W18X76									COMPACT
		(C)	1.096	.038	.000	1.058	.00	5	(H1-3)	
		(T)	1.242	.128	.000	1.115	.00	6	(H2-1)	
35	W18X76									COMPACT
		(T)	.537	.146	.000	.391	84.00	6	(H2-1)	
36	W18X76									COMPACT
		(T)	.542	.151	.000	.391	.00	6	(H2-1)	
101	W10X22									COMPACT
		(T)	.507	.000	.507	.000	.00	7	(BENDING)	
102	W10X22									COMPACT
		(C)	.647	.434	.213	.000	.00	5	(H1-1)	
103	W10X22									COMPACT
		(C)	.874	.576	.298	.000	.00	5	(H1-1)	
104	W10X22									COMPACT
		(C)	.993	.651	.342	.000	.00	5	(H1-1)	
105	W10X22									COMPACT
		(C)	1.085	.724	.360	.000	.00	5	(H1-1)	
106	W10X22									COMPACT
		(C)	1.022	.839	.183	.000	.00	5	(H1-1)	
107	W10X22									COMPACT
		(C)	1.233	.929	.303	.000	.00	5	(H1-1)	
108	W10X22									COMPACT
		(C)	1.291	.935	.356	.000	.00	5	(H1-1)	
109	W10X22									COMPACT
		(C)	1.273	.880	.393	.000	.00	5	(H1-1)	
110	W10X22									COMPACT
		(C)	1.206	.751	.455	.000	.00	5	(H1-1)	
		(T)	.501	.000	.501	.000	240.00	6	(BENDING)	
111	W10X22									COMPACT
		(C)	1.196	.664	.531	.000	.00	5	(H1-1)	
		(T)	.562	.000	.562	.000	240.00	6	(BENDING)	
112	W10X22									COMPACT
		(C)	.741	.271	.471	.000	.00	5	(H1-1)	
		(T)	.661	.000	.661	.000	240.00	6	(BENDING)	
113	W18X65									COMPACT
		(T)	.519	.188	.000	.331	.00	6	(H2-1)	
114	W18X76									COMPACT
		(T)	.526	.172	.000	.354	.00	6	(H2-1)	
124	W18X76									COMPACT
		(T)	.694	.120	.000	.574	.00	6	(H2-1)	
125	W18X65									COMPACT
		(C)	.755	.013	.000	.742	.00	6	(H1-3)	
		(T)	.596	.077	.000	.519	.00	5	(H2-1)	

SF-Type I All Hangars No Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7555	G									NON-COM
		(C)	1.294	1.224	.070	.000	150.15	7	(H1-1)	
		(T)	.798	.756	.042	.000	150.15	4	(H2-1)	
7556	G									NON-COM
		(C)	1.317	1.218	.099	.000	.00	7	(H1-1)	
		(T)	.792	.759	.033	.000	.00	4	(H2-1)	
7557	G		fa > Fe							NON-COM
7558	G		fa > Fe							NON-COM
7559	G									NON-COM
		(C)	1.098	1.044	.054	.000	78.67	5	(H1-1)	
		(T)	.632	.583	.049	.000	157.33	4	(H2-1)	
7560	G									NON-COM
		(C)	1.087	1.038	.049	.000	78.67	5	(H1-1)	
		(T)	.621	.586	.034	.000	.00	4	(H2-1)	
7561	G		fa > Fe							NON-COM
7562	G		fa > Fe							NON-COM
7563	G		fa > Fe							NON-COM
7564	G		fa > Fe							NON-COM
7565	G		fa > Fe							NON-COM
7566	G		fa > Fe							NON-COM
7567	G		fa > Fe							NON-COM
7568	G		fa > Fe							NON-COM
7569	G									NON-COM
		(C)	3.822	3.230	.592	.000	157.33	4	(H1-1)	
		(T)	.629	.560	.069	.000	157.33	5	(H2-1)	
7570	G									NON-COM
		(C)	3.770	3.259	.511	.000	.00	4	(H1-1)	
		(T)	.639	.553	.086	.000	.00	5	(H2-1)	
7571	G									NON-COM
		(C)	.563	.396	.167	.000	129.34	5	(H1-1)	
7572	G									NON-COM
		(C)	.570	.399	.172	.000	.00	5	(H1-1)	
7575	G									NON-COM
		(C)	1.426	1.209	.217	.000	157.33	5	(H1-1)	
		(T)	.619	.588	.031	.000	78.67	6	(H2-1)	
7576	G									NON-COM
		(C)	1.283	1.197	.086	.000	.00	5	(H1-1)	
		(T)	.650	.592	.058	.000	.00	6	(H2-1)	
7580	G									NON-COM
		(C)	1.041	.672	.000	.368	120.00	4	(H1-1)	
		(T)	.642	.522	.000	.119	120.00	7	(H2-1)	
7581	G									NON-COM
		(C)	1.045	.680	.000	.365	.00	4	(H1-1)	
		(T)	.617	.515	.000	.103	.00	7	(H2-1)	
7600	G		fa > Fe							NON-COM
7601	G									NON-COM
		(C)	2.037	.856	.000	1.181	.00	5	(H1-1)	
		(T)	.556	.460	.000	.096	.00	6	(H2-1)	
7604	G									NON-COM
		(C)	1.377	1.219	.158	.000	100.00	5	(H1-1)	

SF-Type I All Hangars No Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7605	G									NON-COM
		(C)	1.075	1.003	.072	.000	.00	5	(H1-1)	
7606	G									NON-COM
		(C)	.917	.877	.040	.000	50.00	4	(H1-1)	
7607	G									NON-COM
		(C)	.912	.875	.037	.000	.00	4	(H1-1)	
7608	G									NON-COM
		(C)	.997	.924	.073	.000	100.00	5	(H1-1)	
7609	G									NON-COM
		(C)	1.196	1.128	.068	.000	.00	5	(H1-1)	
7610	G									NON-COM
		(C)	1.033	.982	.052	.000	100.00	4	(H1-1)	
7611	G									NON-COM
		(C)	1.058	.997	.061	.000	.00	4	(H1-1)	
7620	G									NON-COM
		(C)	.927	.679	.000	.248	120.00	5	(H1-1)	
		(T)	.532	.390	.000	.143	120.00	6	(H2-1)	
7621	G									NON-COM
		(C)	.914	.580	.000	.334	.00	5	(H1-1)	
		(T)	.509	.380	.000	.129	.00	6	(H2-1)	
7624	G									NON-COM
		(C)	.828	.767	.061	.000	100.00	5	(H1-1)	
7625	G									NON-COM
		(C)	.583	.551	.032	.000	.00	5	(H1-1)	
7628	G									NON-COM
		(C)	.532	.494	.038	.000	100.00	5	(H1-1)	
7629	G									NON-COM
		(C)	.727	.699	.028	.000	50.00	5	(H1-1)	
7630	G									NON-COM
		(C)	.525	.491	.034	.000	100.00	4	(H1-1)	
7631	G									NON-COM
		(C)	.561	.525	.036	.000	.00	4	(H1-1)	
7640	G									NON-COM
		(C)	.687	.504	.000	.182	120.00	5	(H1-1)	
7641	G									NON-COM
		(C)	.666	.424	.000	.242	.00	5	(H1-1)	
7644	G									NON-COM
		(C)	.623	.577	.045	.000	100.00	5	(H1-1)	
7646	G									NON-COM
		(C)	.527	.503	.024	.000	100.00	4	(H1-1)	
7649	G									NON-COM
		(C)	.538	.506	.031	.000	.00	5	(H1-1)	
7651	G									NON-COM
		(C)	.628	.588	.040	.000	.00	4	(H1-1)	
7660	G									NON-COM
		(C)	.525	.316	.000	.210	120.00	4	(H1-1)	
7661	G									NON-COM
		(C)	.555	.416	.000	.139	.00	4	(H1-1)	
7664	G									NON-COM
		(C)	.740	.694	.047	.000	100.00	5	(H1-1)	

SF-Type I All Hangars No Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7665	G									NON-COM
		(C)	.582	.551	.031	.000	.00	5	(H1-1)	
7666	G									NON-COM
		(C)	.622	.590	.032	.000	100.00	4	(H1-1)	
7667	G									NON-COM
		(C)	.503	.468	.036	.000	.00	4	(H1-1)	
7668	G									NON-COM
		(C)	.513	.479	.034	.000	100.00	5	(H1-1)	
7669	G									NON-COM
		(C)	.639	.611	.028	.000	.00	5	(H1-1)	
7670	G									NON-COM
		(C)	.587	.553	.034	.000	100.00	4	(H1-1)	
7671	G									NON-COM
		(C)	.734	.687	.047	.000	.00	4	(H1-1)	
7680	G									NON-COM
		(C)	.737	.516	.000	.220	120.00	5	(H1-1)	
7681	G									NON-COM
		(C)	.734	.508	.000	.226	.00	5	(H1-1)	
		(T)	.512	.372	.000	.140	.00	6	(H2-1)	
7700	G			fa > Fe						NON-COM
7701	G									NON-COM
		(C)	3.187	.946	.000	2.240	.00	5	(H1-1)	
		(T)	.689	.584	.000	.105	.00	6	(H2-1)	
7704	G									NON-COM
		(C)	1.010	.923	.087	.000	100.00	5	(H1-1)	
7705	G									NON-COM
		(C)	.672	.636	.036	.000	.00	5	(H1-1)	
7708	G									NON-COM
		(C)	.606	.561	.045	.000	100.00	5	(H1-1)	
7709	G									NON-COM
		(C)	.871	.836	.035	.000	50.00	5	(H1-1)	
7720	G									NON-COM
		(C)	1.669	.891	.000	.778	120.00	5	(H1-1)	
		(T)	.705	.565	.000	.140	120.00	6	(H2-1)	
7721	G									NON-COM
		(C)	1.567	.836	.000	.731	.00	5	(H1-1)	
		(T)	.678	.553	.000	.125	.00	6	(H2-1)	
7724	G									NON-COM
		(C)	.741	.681	.060	.000	100.00	5	(H1-1)	
7729	G									NON-COM
		(C)	.631	.602	.029	.000	50.00	5	(H1-1)	
7740	G									NON-COM
		(C)	1.333	.831	.000	.502	120.00	5	(H1-1)	
		(T)	.703	.566	.000	.137	120.00	6	(H2-1)	
7741	G									NON-COM
		(C)	1.305	.772	.000	.534	.00	5	(H1-1)	
		(T)	.689	.559	.000	.129	.00	6	(H2-1)	
7743	G									NON-COM
		(C)	.508	.452	.056	.000	.00	5	(H1-1)	

SF-Type I All Hangars No Infill Struts

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7744	G									NON-COM
		(C)	.775	.714	.061	.000	100.00	5	(H1-1)	
7749	G									NON-COM
		(C)	.657	.626	.032	.000	50.00	5	(H1-1)	
7760	G									NON-COM
		(C)	1.318	.809	.000	.509	120.00	5	(H1-1)	
		(T)	.735	.596	.000	.138	120.00	6	(H2-1)	
7761	G									NON-COM
		(C)	1.290	.754	.000	.537	.00	5	(H1-1)	
		(T)	.720	.590	.000	.130	.00	6	(H2-1)	
7764	G									NON-COM
		(C)	.627	.574	.053	.000	100.00	5	(H1-1)	
7780	G									NON-COM
		(C)	1.288	.793	.000	.495	120.00	5	(H1-1)	
		(T)	.776	.644	.000	.131	120.00	6	(H2-1)	
7781	G									NON-COM
		(C)	1.270	.750	.000	.520	.00	5	(H1-1)	
		(T)	.777	.645	.000	.132	.00	6	(H2-1)	
7784	G									NON-COM
		(C)	.556	.504	.052	.000	100.00	5	(H1-1)	
7800	G									NON-COM
		(C)	3.931	.959	.000	2.972	120.00	5	(H1-1)	
		(T)	.670	.580	.000	.090	120.00	6	(H2-1)	
7801	G									NON-COM
		(C)	3.808	.957	.000	2.851	.00	5	(H1-1)	
		(T)	.768	.619	.000	.150	.00	6	(H2-1)	
7827	G									NON-COM
		(C)	.535	.266	.270	.000	.00	5	(H1-1)	

SF-Type II Hangars 44 and 45

c SAP90 INPUT

```
system
L=11
C
C
C
joints
51   x=0 y=0    z=160
6051 x=0 y=2880 z=160  g=51,6051,500
1    x=0 y=0    z=0
6001 x=0 y=2880 z=0    g=1,6001,500
2    x=0 y=0    z=-168
6002 x=0 y=2880 z=-168 g=2,6002,500
3    x=0 y=0    z=-384
6003 x=0 y=2880 z=-384 g=3,6003,500
4    x=0 y=120  z=-84
5    x=0 y=360  z=-232
6    x=0 y=1320 z=-84
7    x=0 y=1320 z=-276
8    x=0 y=2760 z=-84
9    x=0 y=2760 z=-276
10   x=0 y=240  z=-295.5
11   x=0 y=480  z=-295.5
6510  x=0 y=120  z=0
6565  x=0 y=2760 z=0       g=6510,6565,5
6511  x=0 y=180  z=80
6566  x=0 y=2820 z=80      g=6511,6566,5
6512  x=0 y=120  z=160
6567  x=0 y=2760 z=160     g=6512,6567,5
6513  x=0 y=60   z=80
6568  x=0 y=2700 z=80      g=6513,6568,5
6514  x=0 y=120  z=80
6569  x=0 y=2760 z=80      g=6514,6569,5

restraints
3  6003 500  r=1,1,1,0,0,0
1  6001 500  r=1,0,0,0,0,0
51 6051 500  r=1,0,0,0,0,0

frame
nm=56 nl=0 z=-1,0,0,0,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333  E=29000
2  sh=w12x35              w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=15x3x5/16        w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
```

```
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
C
7580    1 6510 m=46 lp=1,0  lr=0,0,0,1,0,0
7581 6510  501 m=46 lp=1,0  lr=0,0,0,0,1,0
7600  501 6515 m=47 lp=1,0   g=9,20,500,5  lr=0,0,0,1,0,0
7601 6515 1001 m=47 lp=1,0   g=9,20,5,500  lr=0,0,0,0,1,0
7800 5501 6565 m=46 lp=1,0   lr=0,0,0,1,0,0
7801 6565 6001 m=46 lp=1,0   lr=0,0,0,0,1,0
7582   51 6512 m=50 lp=-3,0  g=1,20,500,5  lr=1,0,0,0,0,0
7583 6512  551 m=50 lp=-3,0  g=1,20,5,500  lr=0,1,0,0,0,0
7622 1051 6522 m=50 lp=-3,0  g=1,20,500,5  lr=1,0,0,0,0,0
7623 6522 1551 m=50 lp=-3,0  g=1,20,5,500  lr=0,1,0,0,0,0
7662 2051 6532 m=50 lp=-3,0  g=7,20,500,5  lr=1,0,0,0,0,0
7663 6532 2551 m=50 lp=-3,0  g=7,20,5,500  lr=0,1,0,0,0,0
```

```
7584    1 6513 m=51 lp=-3,0  g=11,20,500,5 lr=1,0,0,0,0,0
7585 6513 6512 m=51 lp=-3,0  g=11,20,5,5   lr=0,1,0,0,0,0
7586   51 6513 m=51 lp=-3,0  g=11,20,500,5 lr=1,0,0,0,0,0
7587 6513 6510 m=51 lp=-3,0  g=11,20,5,5   lr=0,1,0,0,0,0
7588 6510 6511 m=51 lp=-3,0  g=11,20,5,5   lr=1,0,0,0,0,0
7589 6511  551 m=51 lp=-3,0  g=11,20,5,500 lr=0,1,0,0,0,0
7590 6512 6511 m=51 lp=-3,0  g=11,20,5,5   lr=1,0,0,0,0,0
7591 6511  501 m=51 lp=-3,0  g=11,20,5,500 lr=0,1,0,0,0,0
7592 6513 6514 m=52 lp=-3,0  g=11,20,5,5   lr=1,1,0,0,0,0
7593 6514 6511 m=52 lp=-3,0  g=11,20,5,5   lr=1,1,0,0,0,0
7594 6510 6514 m=45 lp=2,0   g=11,20,5,5   lr=1,0,0,0,0,0
7595 6514 6512 m=45 lp=2,0   g=11,20,5,5   lr=0,1,0,0,0,0
C
1    2    4    m=48 lp=3,0
2    4    501  m=48 lp=3,0
3    1    4    m=40 lp=3,0
4    4    502  m=40 lp=3,0
5    10   5    m=48 lp=3,0
6    5    1002 m=48 lp=3,0
7    502  5    m=40 lp=3,0
8    5    11   m=40 lp=3,0
9    2502 6    m=4 lp=3,0
10   6    3001 m=4 lp=3,0
11   2501 6    m=4 lp=3,0
12   6    3002 m=4 lp=3,0
13   2503 7    m=4 lp=3,0
14   7    3002 m=4 lp=3,0
15   2502 7    m=4 lp=3,0
16   7    3003 m=4 lp=3,0
17   5502 8    m=40 lp=3,0
18   8    6001 m=40 lp=3,0
19   5501 8    m=48 lp=3,0
20   8    6002 m=48 lp=3,0
21   5503 9    m=40 lp=3,0
22   9    6002 m=40 lp=3,0
23   5502 9    m=48 lp=3,0
24   9    6003 m=48 lp=3,0
37   2    502  m=26 lp=3,0 g=11,1,500,500
62   2     1   m=17 lp=2,0
63   502  501  m=1  lp=2,0 g=10,1,500,500
74   6002 6001 m=17 lp=2,0
75   3    2    m=17 lp=2,0
76   503  10   m=1  lp=2,0
77   10   502  m=1  lp=2,0
78   1003 11   m=1  lp=2,0
79   11   1002 m=1  lp=2,0
80   1503 1502 m=1  lp=2,0 g=8,1,500,500
89   6003 6002 m=17 lp=2,0
90   1    51   m=17 lp=2,0
91   501  551  m=1  lp=2,0 g=10,1,500,500
102  6001 6051 m=17 lp=2,0

loads
51   6051 6000 l=1  f=0,0,-9.5
551  5551 500  l=1  f=0,0,-19
1              l=1  f=0,0,-1.65
501            l=1  f=0,0,-1.65
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3001                1=1  f=0,0,-1.65
5501                1=1  f=0,0,-1.65
6001                1=1  f=0,0,-1.65
51    6051 500      1=1  f=0,0,-.355
1     6001 6000     1=1  f=0,0,-6.93
1     6001 6000     1=2  f=0,0,-6.4
501   5501 500      1=2  f=0,0,-12.8
1     6001 6000     1=3  f=0,0,-12.1
501   5501 500      1=3  f=0,0,-24.2
501   5501 500      1=1  f=0,0,-.61
1     6001 500      1=4  f=0,0,-3.25
51    6051 6000     1=5  f=0,0,11.7
551   5551 500      1=5  f=0,0,23.4
51    6051 6000     1=6  f=0,0,-2.4
551   5551 500      1=6  f=0,0,-4.8
51    6051 6000     1=7  f=0,0,66
551   5551 500      1=7  f=0,0,132
C
51                  1=8  f=0,0,23.2
551                 1=8  f=0,0,46.4
1051                1=8  f=0,0,29.6
1551                1=8  f=0,0,12.8
2051                1=8  f=0,0,4
2551 5551 500       1=8  f=0,0,-4.8
6051                1=8  f=0,0,-2.4
1                   1=8  f=0,77.8,0
2                   1=8  f=0,24,0
1 51 50             1=8  f=0,35,0
6001                1=8  f=0,10.25,0
6002                1=8  f=0,8.5,0
6001 6051 50        1=8  f=0,4.5,0
C
6051                1=9  f=0,0,23.2
5551                1=9  f=0,0,46.4
5051                1=9  f=0,0,29.6
4551                1=9  f=0,0,12.8
4051                1=9  f=0,0,4
3551  551 500       1=9  f=0,0,-4.8
51                  1=9  f=0,0,-2.4
6001                1=9  f=0,-77.8,0
6002                1=9  f=0,-24,0
6001 6051 50        1=9  f=0,-35,0
1                   1=9  f=0,-10.25,0
2                   1=9  f=0,-8.5,0
1       51 50       1=9  f=0,-4.5,0
C
51                  1=10 f=0,0,76.8
551                 1=10 f=0,0,153.6
1051                1=10 f=0,0,137.6
1551                1=10 f=0,0,121.8
2051                1=10 f=0,0,112.8
2551 5551 500       1=10 f=0,0,104
6051                1=10 f=0,0,52
1                   1=10 f=0,-12.8,0
2                   1=10 f=0,-4.7,0
1 51 50             1=10 f=0,-5.7,0
6001                1=10 f=0,110,0
```

```
6002                1=10 f=0,40.2,0
6001 6051 50        1=10 f=0,49,0
C
6051                1=11 f=0,0,76.8
5551                1=11 f=0,0,153.6
5051                1=11 f=0,0,137.6
4551                1=11 f=0,0,121.6
4051                1=11 f=0,0,112.8
3551  551 500       1=11 f=0,0,104
51                  1=11 f=0,0,52
6001                1=11 f=0,12.8,0
6002                1=11 f=0,4.7,0
6001 6051 50        1=11 f=0,5.7,0
1                   1=11 f=0,-110,0
2                   1=11 f=0,-40.2,0
1      51 50        1=11 f=0,-49,0
```

SF-Type II Hangars 44 and 45

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,4,5,7 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,1,0,0,0,0,0,0
2 c=1,0,0,1,0,1,0,0,0,0,0
3 c=1,0,0,1,0,0,1,0,0,0,0
4 c=1,0,0,1,0,0,0,1,0,0,0
5 c=1,0,0,1,0,0,0,0,1,0,0
6 c=1,0,0,1,0,0,0,0,0,1,0
7 c=1,0,0,1,0,0,0,0,0,0,1

sections
57 mn=s sh=g e=29000 fy=36 a=6.94 i=54.7,13.5 \
        as=4.5,3 z=15.2,6.75 t=8.375,6          :2Z4x3
58 mn=s sh=g e=29000 fy=36 a=7.22 i=17.5,35.6 \
        as=3.75,3.75 z=8.72,11.4 t=7.22,10.375 :2L5x5x3/8
59 mn=s sh=g e=29000 fy=36 a=7.07 i=99.4,6.07 \
        as=4.68,4.29 z=29.9,6.35 t=11.52,6.674 :C10x20,L3x2x/14
60 mn=s sh=g e=29000 fy=36 a=1.19 i=1.09,.392 \
        as=.5,.75 z=.973,.468 t=4.014,3.014    :1L3x2x1/4
61 mn=s sh=g e=29000 fy=36 a=1.31 i=1.17,.743 \
        as=.625,.75 z=1.02,.724 t=4.18,2.68    :1L3x2.5x1/4
62 mn=s sh=g e=29000 fy=36 a=2.4 i=6.26,1.75  \
        as=1.56,.94 z=3.36,1.35 t=6.64,4.64    :1L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=6.84 i=25.7,13.2 \
        as=1.31,2.25 z=11.5,4.4 t=7.92,7.375   :2L6x3.5x3/8
64 mn=s sh=g e=29000 fy=36 a=5.68 i=86.9,5.86 \
        as=4.48,2.9 z=29.4,7.53 t=21.9,6.59    :C10x15.3,1L3x2x1/4
65 mn=s sh=g e=29000 fy=36 a=11.03 i=281,49.9 \
        as=6.69,5.37 z=49.3,17.72 t=15.9,8     :C8x11.5,12-I-25
66 mn=s sh=g e=29000 fy=36 a=4.8 i=12.5,7.14  \
        as=3.1,2     z=6.71,2.7   t=6.64,6.375 :2L5x3x5/16

frame
75      l=.33,1
76 78 2 l=.5,1
80 89 1 l=.33,1
62 74 1 l=.66,1
37 48 1 l=1,.001
7580 7581 1 m=59
7600 7780 20 m=64
7601 7781 20 m=64
7800 7801 1 m=59
7582 7802 20 m=58
7583 7805 20 m=58
7584 7804 20 m=61
7585 7805 20 m=61
7586 7806 20 m=61
7587 7807 20 m=61
7588 7808 20 m=61
7589 7809 20 m=61
7590 7810 20 m=61
7591 7811 20 m=61
```

```
7592 7812 20 m=60
7593 7813 20 m=60
7594 7814 20 m=57
7595 7815 20 m=57
1       2 1  m=63
3       4 1  m=66
5       6 1  m=63
7       8 1  m=66
9      16 1  m=62
17     18 1  m=66
19     20 1  m=63
21     22 1  m=66
23     24 1  m=63
```

SF-type II Hangar 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
3	G									NON-COM
		(C)	1.080	.963	.116	.000	.00	4	(H1-1)	
		(T)	.711	.631	.080	.000	146.48	7	(H2-1)	
4	G									NON-COM
		(C)	1.109	.972	.137	.000	.00	4	(H1-1)	
		(T)	.706	.626	.080	.000	146.48	7	(H2-1)	
5	G									NON-COM
		(C)	.632	.131	.501	.000	.00	7	(H1-3)	
8	G									NON-COM
		(C)	.798	.235	.563	.000	135.77	4	(H1-1)	
		(T)	.744	.162	.582	.000	135.77	7	(H2-1)	
9	G									NON-COM
		(C)	1.805	1.713	.092	.000	.00	5	(H1-1)	
		(T)	.538	.486	.052	.000	146.48	6	(H2-1)	
10	G									NON-COM
		(C)	1.774	1.691	.083	.000	.00	5	(H1-1)	
		(T)	.558	.492	.065	.000	146.48	6	(H2-1)	
11	G									NON-COM
		(C)	2.641	2.505	.136	.000	146.48	4	(H1-1)	
		(T)	.727	.672	.055	.000	146.48	7	(H2-1)	
12	G									NON-COM
		(C)	2.724	2.528	.196	.000	.00	4	(H1-1)	
		(T)	.734	.667	.067	.000	146.48	7	(H2-1)	
13	G			fa > Fe						NON-COM
14	G			fa > Fe						NON-COM
15	G			fa > Fe						NON-COM
16	G			fa > Fe						NON-COM
17	G									NON-COM
		(C)	1.614	1.393	.221	.000	146.48	5	(H1-1)	
		(T)	.885	.844	.041	.000	.00	6	(H2-1)	
18	G									NON-COM
		(C)	1.515	1.386	.129	.000	73.24	5	(H1-1)	
		(T)	.906	.850	.056	.000	.00	6	(H2-1)	
19	G									NON-COM
		(C)	.881	.788	.093	.000	146.48	6	(H1-1)	
		(T)	.517	.436	.082	.000	.00	5	(H2-1)	
20	G									NON-COM
		(C)	.855	.794	.061	.000	.00	6	(H1-1)	
21	G			fa > Fe						NON-COM
22	G			fa > Fe						NON-COM
23	G									NON-COM
		(C)	1.969	1.537	.432	.000	.00	6	(H1-1)	
		(T)	.774	.698	.076	.000	161.44	5	(H2-1)	
24	G									NON-COM
		(C)	2.083	1.544	.539	.000	161.44	6	(H1-1)	
		(T)	.768	.696	.072	.000	161.44	5	(H2-1)	
38	W14X30									NON-COM
		(T)	.628	.513	.115	.000	240.00	7	(H2-1)	
39	W14X30									NON-COM
		(T)	.564	.505	.059	.000	120.00	7	(H2-1)	

SF-type II Hangar 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
40	W14X30									NON-COM
		(C)	.513	.405	.108	.000	240.00	4	(H1-1)	
		(T)	.644	.504	.140	.000	.00	7	(H2-1)	
41	W14X30									NON-COM
		(C)	.531	.406	.126	.000	240.00	4	(H1-1)	
		(T)	.627	.504	.122	.000	.00	7	(H2-1)	
76	W18X76									COMPACT
		(C)	.691	.001	.000	.690	88.50	7	(H1-3)	
		(T)	.530	.231	.000	.298	88.50	6	(H2-1)	
77	W18X76									COMPACT
		(T)	.608	.013	.000	.595	.00	7	(H2-1)	
78	W18X76									COMPACT
		(C)	.939	.039	.000	.900	88.50	7	(H1-3)	
79	W18X76									COMPACT
		(C)	.896	.060	.000	.836	.00	7	(H1-3)	
88	W18X76									NON-COM
		(T)	.526	.449	.000	.077	216.00	6	(H2-1)	
89	W18X65									COMPACT
		(C)	.835	.673	.000	.162	216.00	6	(H1-1)	
7580	G			fa > Fe						NON-COM
7581	G			fa > Fe						NON-COM
7584	G									NON-COM
		(C)	.643	.579	.064	.000	100.00	4	(H1-1)	
7589	G									NON-COM
		(C)	.501	.475	.027	.000	50.00	4	(H1-1)	
7600	G									NON-COM
		(C)	1.656	.859	.000	.797	120.00	4	(H1-1)	
		(T)	.757	.647	.000	.110	120.00	7	(H2-1)	
7601	G									NON-COM
		(C)	1.660	.861	.000	.798	.00	4	(H1-1)	
		(T)	.748	.643	.000	.105	.00	7	(H2-1)	
7620	G									NON-COM
		(C)	1.548	.844	.000	.704	120.00	4	(H1-1)	
		(T)	.737	.629	.000	.109	120.00	7	(H2-1)	
7621	G									NON-COM
		(C)	1.546	.845	.000	.701	.00	4	(H1-1)	
		(T)	.738	.629	.000	.109	.00	7	(H2-1)	
7640	G									NON-COM
		(C)	1.561	.845	.000	.716	120.00	4	(H1-1)	
		(T)	.733	.629	.000	.104	120.00	7	(H2-1)	
7641	G									NON-COM
		(C)	1.598	.861	.000	.737	.00	4	(H1-1)	
		(T)	.749	.637	.000	.112	.00	7	(H2-1)	
7651	G									NON-COM
		(C)	.520	.472	.049	.000	.00	4	(H1-1)	
7660	G									NON-COM
		(C)	1.916	.886	.000	1.031	120.00	4	(H1-1)	
		(T)	.739	.652	.000	.087	120.00	7	(H2-1)	

SF-type II Hangar 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7661	G									NON-COM
		(C)	2.461	.947	.000	1.515	.00	4	(H1-1)	
		(T)	.812	.689	.000	.123	.00	7	(H2-1)	
7666	G									NON-COM
		(C)	.632	.605	.026	.000	50.00	4	(H1-1)	
7671	G									NON-COM
		(C)	.766	.704	.062	.000	.00	4	(H1-1)	
7680	G									NON-COM
		(C)	.787	.551	.000	.235	120.00	4	(H1-1)	
		(T)	.584	.472	.000	.112	120.00	7	(H2-1)	
7681	G									NON-COM
		(C)	.783	.543	.000	.240	.00	4	(H1-1)	
		(T)	.580	.470	.000	.110	.00	7	(H2-1)	
7700	G									NON-COM
		(C)	.566	.399	.000	.167	120.00	5	(H1-1)	
		(T)	.522	.377	.000	.145	120.00	6	(H2-1)	
7701	G									NON-COM
		(C)	.554	.401	.000	.153	.00	4	(H1-1)	
		(T)	.547	.416	.000	.132	.00	7	(H2-1)	
7706	G									NON-COM
		(C)	.509	.486	.024	.000	100.00	4	(H1-1)	
7711	G									NON-COM
		(C)	.610	.568	.042	.000	.00	4	(H1-1)	
7720	G									NON-COM
		(C)	.627	.426	.000	.201	120.00	4	(H1-1)	
		(T)	.551	.414	.000	.137	120.00	7	(H2-1)	
7721	G									NON-COM
		(C)	.640	.452	.000	.188	.00	4	(H1-1)	
7740	G									NON-COM
		(C)	.677	.460	.000	.217	120.00	4	(H1-1)	
7741	G									NON-COM
		(C)	.690	.487	.000	.203	.00	4	(H1-1)	
		(T)	.536	.390	.000	.146	.00	7	(H2-1)	
7760	G									NON-COM
		(C)	.756	.505	.000	.251	120.00	4	(H1-1)	
		(T)	.528	.404	.000	.124	120.00	7	(H2-1)	
7761	G									NON-COM
		(C)	.780	.552	.000	.228	.00	4	(H1-1)	
		(T)	.576	.428	.000	.148	.00	7	(H2-1)	
7771	G									NON-COM
		(C)	.512	.471	.042	.000	.00	4	(H1-1)	
7780	G									NON-COM
		(C)	1.020	.624	.000	.396	120.00	4	(H1-1)	
		(T)	.566	.467	.000	.099	120.00	7	(H2-1)	
7781	G									NON-COM
		(C)	1.107	.756	.000	.351	.00	4	(H1-1)	
		(T)	.703	.536	.000	.167	.00	7	(H2-1)	
7784	G									NON-COM
		(C)	.826	.775	.051	.000	100.00	5	(H1-1)	

SF-type II Hangar 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7785	G									NON-COM
		(C)	.730	.697	.033	.000	.00	5	(H1-1)	
7786	G									NON-COM
		(C)	.822	.778	.044	.000	100.00	4	(H1-1)	
		(T)	.520	.498	.022	.000	100.00	7	(H2-1)	
7787	G									NON-COM
		(C)	.673	.625	.048	.000	.00	4	(H1-1)	
7788	G									NON-COM
		(C)	.620	.590	.030	.000	100.00	5	(H1-1)	
7789	G									NON-COM
		(C)	.688	.657	.032	.000	50.00	5	(H1-1)	
		(T)	.508	.475	.033	.000	.00	6	(H2-1)	
7790	G									NON-COM
		(C)	.749	.703	.046	.000	100.00	4	(H1-1)	
7791	G									NON-COM
		(C)	.936	.867	.069	.000	.00	4	(H1-1)	
		(T)	.501	.481	.019	.000	.00	7	(H2-1)	
7800	G									NON-COM
		(C)	1.540	.823	.000	.718	120.00	5	(H1-1)	
		(T)	.577	.478	.000	.099	120.00	6	(H2-1)	
7801	G									NON-COM
		(C)	1.597	.848	.000	.750	.00	5	(H1-1)	
		(T)	.667	.519	.000	.148	.00	6	(H2-1)	
7811	G									NON-COM
		(C)	.511	.459	.052	.000	.00	5	(H1-1)	

Truss T1 Hangars 44 and 45 **Average Wind**

c **SAP90 INPUT**

```
system
L=12
C
C
C
joints
C    Truss Joints T1
501  x=0    z=0          y=240
549  x=3840 z=0          y=240 g=501,549,2
551  x=0    z=160        y=240
575  x=1920 z=200        y=240 g=551,575,1
599  x=3840 z=160        y=240 g=575,599,1
602  x=80   z=80
612  x=880  z=88.333           g=602,612,2
614  x=1040 z=91.6667    y=240
624  x=1840 z=100        y=240 g=614,624,2
626  x=2000 z=100        y=240
636  x=2800 z=91.6667    y=240 g=626,636,2
638  x=2960 z=88.3333    y=240
648  x=3760 z=80         y=240 g=638,648,2
C      Bracing Frame Joints T1
667  x=0    z=-384   y=240
674  x=3840 z=-43    y=240
678  x=4152 z=-43    y=240 g=674,678,1
679  x=3840 z=-203.5 y=240
683  x=4152 z=-203.5 y=240 g=679,683,1
685  x=3840 z=-384   y=240
686  x=4152 z=-384   y=240

restraints
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
nm=56 nl=18 z=-1,0,0,0,0,0,0,0,0,0,0,0
1  sh=w18x76             w=.006333   E=29000
2  sh=218x6x1/2-3        w=.0038333
3  sh=216x6x3/8-3        w=.00248333
4  sh=213x3.5x5/16-3     w=.0011
5  sh=213x3x1/4-3        w=.00081667
6  sh=216x3.5x5/16-3     w=.0016333
7  sh=213x3x5/16-3       w=.00101667
8  sh=2L3.5X2.5X5/16-3   w=.001008333
9  sh=213x2.5x1/4-3      w=.00075
10 sh=213x2x5/16-3       w=.0008333
```

```
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
13 sh=214x3x5/16-3        w=.0012
14 sh=216x4x3/8-3         w=.00205
15 sh=215x3x1/4-3         w=.0011
16 sh=215x3.5x5/16-3      w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3         w=.0040333
22 sh=213x2.5x1/4-3       w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3       w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3       w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3       w=.00195
49 sh=215x3x5/16-3        w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3      w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
C       Live Load on braced frames
1 wg=0,0,-.1667      :100 psf---T1
C       Slab load on braced frames
2 wg=0,0,-.08333     :150pcfx4 in. ---T1
C        Roof Dead Loads
3 wg=0,0,-.005
C        Roof Live Loads
4 wg=0,0,-.033333
C        Wind Span Loads
5  wg=.09667,0,0
6  wg=.101667,0,0
```

```
7  wg=.006667,0,0
8  wg=-.02333,0,0
9  wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
14 wg=-.09667,0,0
15 wg=-.101667,0,0
16 wg=-.006667,0,0
17 wg=.02333,0,0
18 wg=-.12,0,0
C          Truss Elements T1-b
588  525  575  m=42 lp=2,0
C               Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=2,0 lr=1,0,0,0,0,0
552  503  505  m=3  lp=2,0
553  505  507  m=3  lp=2,0
554  507  509  m=3  lp=2,0
555  509  511  m=11 lp=2,0
556  511  513  m=11 lp=2,0
557  513  515  m=11 lp=2,0
558  515  517  m=11 lp=2,0
559  517  519  m=3  lp=2,0
560  519  521  m=3  lp=2,0
561  521  523  m=3  lp=2,0
562  523  525  m=3  lp=2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=2,0
565  529  531  m=3  lp=2,0
566  531  533  m=3  lp=2,0
567  533  535  m=11 lp=2,0
568  535  537  m=11 lp=2,0
569  537  539  m=11 lp=2,0
570  539  541  m=11 lp=2,0
571  541  543  m=3  lp=2,0
572  543  545  m=3  lp=2,0
573  545  547  m=3  lp=2,0
574  547  549  m=3  lp=2,0  lr=0,1,0,0,0,0
C              Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0     lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0     lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0     lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0     lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0     lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0     lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0    lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0    lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0    lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0    lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0    lr=0,1,0,0,0,0
723  624  523  m=16 lp=-2,0    lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0     lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0     lr=0,1,0,0,0,0
730  630  531  m=13 lp=2,0     lr=0,1,0,0,0,0
732  632  533  m=8  lp=2,0     lr=0,1,0,0,0,0
734  634  535  m=10 lp=2,0     lr=0,1,0,0,0,0
```

```
736   636   537   m=13  lp=2,0        lr=0,1,0,0,0,0
737   638   537   m=13  lp=-2,0       lr=0,1,0,0,0,0
739   640   539   m=10  lp=-2,0       lr=0,1,0,0,0,0
741   642   541   m=9   lp=-2,0       lr=0,1,0,0,0,0
743   644   543   m=8   lp=-2,0       lr=0,1,0,0,0,0
745   646   545   m=7   lp=-2,0       lr=0,1,0,0,0,0
747   648   547   m=4   lp=-2,0       lr=0,1,0,0,0,0
C                     Main Diagonal Top section
701   551   602   m=4   lp=2,0          lr=1,0,0,0,0,0
703   553   604   m=7   lp=2,0          lr=1,0,0,0,0,0
705   555   606   m=8   lp=2,0          lr=1,0,0,0,0,0
707   557   608   m=9   lp=2,0          lr=1,0,0,0,0,0
709   559   610   m=10  lp=2,0          lr=1,0,0,0,0,0
711   561   612   m=13  lp=2,0          lr=1,0,0,0,0,0
714   565   614   m=13  lp=-2,0         lr=1,0,0,0,0,0
716   567   616   m=10  lp=-2,0         lr=1,0,0,0,0,0
718   569   618   m=8   lp=-2,0         lr=1,0,0,0,0,0
720   571   620   m=13  lp=-2,0         lr=1,0,0,0,0,0
722   573   622   m=15  lp=-2,0         lr=1,0,0,0,0,0
724   575   624   m=16  lp=-2,0         lr=1,0,0,0,0,0
725   575   626   m=16  lp=2,0          lr=1,0,0,0,0,0
727   577   628   m=15  lp=2,0          lr=1,0,0,0,0,0
729   579   630   m=13  lp=2,0          lr=1,0,0,0,0,0
731   581   632   m=8   lp=2,0          lr=1,0,0,0,0,0
733   583   634   m=10  lp=2,0          lr=1,0,0,0,0,0
735   585   636   m=13  lp=2,0          lr=1,0,0,0,0,0
738   589   638   m=13  lp=-2,0         lr=1,0,0,0,0,0
740   591   640   m=10  lp=-2,0         lr=1,0,0,0,0,0
742   593   642   m=9   lp=-2,0         lr=1,0,0,0,0,0
744   595   644   m=8   lp=-2,0         lr=1,0,0,0,0,0
746   597   646   m=7   lp=-2,0         lr=1,0,0,0,0,0
748   599   648   m=4   lp=-2,0         lr=1,0,0,0,0,0
C                     Diagonal Brace
626   553   602   m=5   lp=2,0          lr=1,1,0,0,0,0
627   555   604   m=5   lp=2,0          lr=1,1,0,0,0,0
628   557   606   m=5   lp=2,0          lr=1,1,0,0,0,0
629   559   608   m=5   lp=2,0          lr=1,1,0,0,0,0
630   561   610   m=5   lp=2,0          lr=1,1,0,0,0,0
631   563   612   m=5   lp=2,0          lr=1,1,0,0,0,0
632   563   614   m=5   lp=-2,0         lr=1,1,0,0,0,0
633   565   616   m=5   lp=-2,0         lr=1,1,0,0,0,0
634   567   618   m=5   lp=-2,0         lr=1,1,0,0,0,0
635   569   620   m=5   lp=-2,0         lr=1,1,0,0,0,0
636   571   622   m=5   lp=-2,0         lr=1,1,0,0,0,0
637   573   624   m=5   lp=-2,0         lr=1,1,0,0,0,0
638   577   626   m=5   lp=2,0          lr=1,1,0,0,0,0
639   579   628   m=5   lp=2,0          lr=1,1,0,0,0,0
640   581   630   m=5   lp=2,0          lr=1,1,0,0,0,0
641   583   632   m=5   lp=2,0          lr=1,1,0,0,0,0
642   585   634   m=5   lp=2,0          lr=1,1,0,0,0,0
643   587   636   m=5   lp=2,0          lr=1,1,0,0,0,0
644   587   638   m=5   lp=-2,0         lr=1,1,0,0,0,0
645   589   640   m=5   lp=-2,0         lr=1,1,0,0,0,0
646   591   642   m=5   lp=-2,0         lr=1,1,0,0,0,0
647   593   644   m=5   lp=-2,0         lr=1,1,0,0,0,0
648   595   646   m=5   lp=-2,0         lr=1,1,0,0,0,0
649   597   648   m=5   lp=-2,0         lr=1,1,0,0,0,0
```

```
C                Vertical Brace
601  602  552  m=5  lp=2,0       lr=1,1,0,0,0,0
602  604  554  m=5  lp=2,0       lr=1,1,0,0,0,0
603  606  556  m=5  lp=2,0       lr=1,1,0,0,0,0
604  608  558  m=5  lp=2,0       lr=1,1,0,0,0,0
605  610  560  m=5  lp=2,0       lr=1,1,0,0,0,0
606  612  562  m=5  lp=2,0       lr=1,1,0,0,0,0
607  614  564  m=5  lp=2,0       lr=1,1,0,0,0,0
608  616  566  m=5  lp=2,0       lr=1,1,0,0,0,0
609  618  568  m=5  lp=2,0       lr=1,1,0,0,0,0
610  620  570  m=5  lp=2,0       lr=1,1,0,0,0,0
611  622  572  m=5  lp=2,0       lr=1,1,0,0,0,0
612  624  574  m=5  lp=2,0       lr=1,1,0,0,0,0
613  626  576  m=5  lp=-2,0      lr=1,1,0,0,0,0
614  628  578  m=5  lp=-2,0      lr=1,1,0,0,0,0
615  630  580  m=5  lp=-2,0      lr=1,1,0,0,0,0
616  632  582  m=5  lp=-2,0      lr=1,1,0,0,0,0
617  634  584  m=5  lp=-2,0      lr=1,1,0,0,0,0
618  636  586  m=5  lp=-2,0      lr=1,1,0,0,0,0
619  638  588  m=5  lp=-2,0      lr=1,1,0,0,0,0
620  640  590  m=5  lp=-2,0      lr=1,1,0,0,0,0
621  642  592  m=5  lp=-2,0      lr=1,1,0,0,0,0
622  644  594  m=5  lp=-2,0      lr=1,1,0,0,0,0
623  646  596  m=5  lp=-2,0      lr=1,1,0,0,0,0
624  648  598  m=5  lp=-2,0      lr=1,1,0,0,0,0
C                  Top Chord (3 axis ------)
501  551  552  m=2  lp=-2,0      lr=1,0,0,0,0,0
502  552  553  m=2  lp=-2,0
503  553  554  m=2  lp=-2,0
504  554  555  m=2  lp=-2,0
505  555  556  m=2  lp=-2,0
506  556  557  m=2  lp=-2,0
507  557  558  m=2  lp=-2,0
508  558  559  m=2  lp=-2,0
509  559  560  m=12 lp=-2,0
510  560  561  m=12 lp=-2,0
511  561  562  m=12 lp=-2,0
512  562  563  m=12 lp=-2,0
513  563  564  m=12 lp=-2,0
514  564  565  m=12 lp=-2,0
515  565  566  m=12 lp=-2,0
516  566  567  m=12 lp=-2,0
517  567  568  m=2  lp=-2,0
518  568  569  m=2  lp=-2,0
519  569  570  m=2  lp=-2,0
520  570  571  m=2  lp=-2,0
521  571  572  m=2  lp=-2,0
522  572  573  m=2  lp=-2,0
523  573  574  m=2  lp=-2,0
524  574  575  m=2  lp=-2,0     lr=0,1,0,0,0,0
525  575  576  m=2  lp=-2,0     lr=1,0,0,0,0,0
526  576  577  m=2  lp=-2,0
527  577  578  m=2  lp=-2,0
528  578  579  m=2  lp=-2,0
529  579  580  m=2  lp=-2,0
530  580  581  m=2  lp=-2,0
531  581  582  m=2  lp=-2,0
```

```
532   582   583   m=2   lp=-2,0
533   583   584   m=12  lp=-2,0
534   584   585   m=12  lp=-2,0
535   585   586   m=12  lp=-2,0
536   586   587   m=12  lp=-2,0
537   587   588   m=12  lp=-2,0
538   588   589   m=12  lp=-2,0
539   589   590   m=12  lp=-2,0
540   590   591   m=12  lp=-2,0
541   591   592   m=2   lp=-2,0
542   592   593   m=2   lp=-2,0
543   593   594   m=2   lp=-2,0
544   594   595   m=2   lp=-2,0
545   595   596   m=2   lp=-2,0
546   596   597   m=2   lp=-2,0
547   597   598   m=2   lp=-2,0
548   598   599   m=2   lp=-2,0     lr=0,1,0,0,0,0
C                South Vertical Member
576   501   551   m=1   lp=2,0    nsl=0,0,6,8,0,0,0,10,12,0,16,18 \
                                    lr=1,1,0,0,0,0
577   503   553   m=6   lp=2,0      lr=1,1,0,0,0,0
578   505   555   m=6   lp=2,0      lr=1,1,0,0,0,0
579   507   557   m=6   lp=2,0      lr=1,1,0,0,0,0
580   509   559   m=6   lp=2,0      lr=1,1,0,0,0,0
581   511   561   m=6   lp=2,0      lr=1,1,0,0,0,0
582   513   563   m=6   lp=2,0      lr=1,1,0,0,0,0
583   515   565   m=6   lp=2,0      lr=1,1,0,0,0,0
584   517   567   m=6   lp=2,0      lr=1,1,0,0,0,0
585   519   569   m=6   lp=2,0      lr=1,1,0,0,0,0
586   521   571   m=14  lp=2,0      lr=1,1,0,0,0,0
587   523   573   m=14  lp=2,0      lr=1,1,0,0,0,0
589   527   577   m=14  lp=-2,0     lr=1,1,0,0,0,0
590   529   579   m=14  lp=-2,0     lr=1,1,0,0,0,0
591   531   581   m=6   lp=-2,0     lr=1,1,0,0,0,0
592   533   583   m=6   lp=-2,0     lr=1,1,0,0,0,0
593   535   585   m=6   lp=-2,0     lr=1,1,0,0,0,0
594   537   587   m=6   lp=-2,0     lr=1,1,0,0,0,0
595   539   589   m=6   lp=-2,0     lr=1,1,0,0,0,0
596   541   591   m=6   lp=-2,0     lr=1,1,0,0,0,0
597   543   593   m=6   lp=-2,0     lr=1,1,0,0,0,0
598   545   595   m=6   lp=-2,0     lr=1,1,0,0,0,0
599   547   597   m=6   lp=-2,0     lr=1,1,0,0,0,0
600   549   599   m=1   lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17 \
                                    lr=1,1,0,0,0,0
C        Bracing Frame Elements
820   667   501   m=1   lp=2,0    nsl=0,0,5,8,0,0,0,10,12,0,16,18
835   674   675   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0,0,0
836   675   676   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0,0,0
837   676   677   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0,0,0
838   677   678   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0,0,0
859   679   680   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0,0,0
860   680   681   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0,0,0
861   681   682   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0,0,0
862   682   683   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0,0,0
867   686   683   m=20  lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17
868   683   678   m=20  lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17
871   685   679   m=1   lp=2,0
```

```
872   679   674   m=1   lp=2,0
873   674   549   m=1   lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17

loads
C Dead Loads
551 599 48  l=1 f=0,0,-.752
552 554  1  l=1 f=0,0,-1.474
555         l=1 f=0,0,-1.664
556 558 1   l=1 f=0,0,-1.474
559         l=1 f=0,0,-1.664
560 562 1   l=1 f=0,0,-1.474
563         l=1 f=0,0,-1.904
564 566 1   l=1 f=0,0,-1.474
567         l=1 f=0,0,-1.664
568 570 1   l=1 f=0,0,-1.474
571         l=1 f=0,0,-1.664
572 574 1   l=1 f=0,0,-1.474
575         l=1 f=0,0,-2.920
576 578 1   l=1 f=0,0,-1.474
579         l=1 f=0,0,-1.664
580 582 1   l=1 f=0,0,-1.474
583         l=1 f=0,0,-1.664
584 586 1   l=1 f=0,0,-1.474
587         l=1 f=0,0,-1.904
588 590 1   l=1 f=0,0,-1.474
591         l=1 f=0,0,-1.664
592 594 1   l=1 f=0,0,-1.474
595         l=1 f=0,0,-1.664
596 598 1   l=1 f=0,0,-1.474
551 599 48  l=1 f=0,0,-.347
555 559 4   l=1 f=0,0,-.557
563 587 24  l=1 f=0,0,-.322
567 571 4   l=1 f=0,0,-.557
575         l=1 f=0,0,-.163
579 583 4   l=1 f=0,0,-.557
591 595 4   l=1 f=0,0,-.557
509 517 8   l=1 f=0,0,-.355
533 541 8   l=1 f=0,0,-.355
C Live Loads
501 549 48  l=2 f=0,0,-1.066
503 523 2   l=2 f=0,0,-2.133
C Wind I
557        l=3 f=4,0,0
551        l=3 f=0,0,1.73
552 557 1  l=3 f=0,0,3.47
558        l=3 f=0,0,1.67
559 564 1  l=3 f=0,0,1.06
565 598 1  l=3 f=0,0,-.4
599        l=3 f=0,0,-.2
C Wind II
557        l=4 f=-.9,0,0
551        l=4 f=0,0,6.27
552 557 1  l=4 f=0,0,12.53
558        l=4 f=0,0,10.73
559 564 1  l=4 f=0,0,10.13
565 598 1  l=4 f=0,0,8.67
599        l=4 f=0,0,4.33
```

```
C Point Loads
503 523 2    l=5 f=0,0,-.5
527 547 2    l=5 f=0,0,-.5
C Roof Live Loads
551 599 48   l=6 f=0,0,-1.3333
552 598 1    l=6 f=0,0,-2.66667
C Crane Dead Loads for Down Force
527 547 20   l=7 f=0,0,-2.6
529 545 4    l=7 f=0,0,-2.6
527 547 20   l=7 f=0,0,-.773
529 545 16   l=7 f=0,0,-1.6
533 541 8    l=7 f=0,0,-2.134
505 523 18   l=7 f=0,0,-.552
511 517 6    l=7 f=0,0,-.960
C Wind III
551          l=8 f=0,0,.338
552 598 1    l=8 f=0,0,.675
599          l=8 f=0,0,.338
C Wind IV
551          l=9 f=0,0,4.86
552 598 1    l=9 f=0,0,9.72
599          l=9 f=0,0,4.86
C Crane Dead Loads for Uplift
505 523 6    l=10 f=0,0,-.333
527 545 6    l=10 f=0,0,-.333
C Wind I - Reverse Direction
593          l=11 f=-4,0,0
599          l=11 f=0,0,1.73
593 598 1    l=11 f=0,0,3.47
592          l=11 f=0,0,1.67
586 591 1    l=11 f=0,0,1.06
552 585 1    l=11 f=0,0,-.4
551          l=11 f=0,0,-.2
C Wind II - Reverse Direction
593          l=12 f=.9,0,0
599          l=12 f=0,0,6.27
593 598 1    l=12 f=0,0,12.53
592          l=12 f=0,0,10.73
586 591 1    l=12 f=0,0,10.13
552 585 1    l=12 f=0,0,8.67
551          l=12 f=0,0,4.33
```

Truss T1 Hangars 44 and 45 Average Wind

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,0,0,0,1,0,0
2 c=1,0,0,1,1,0,0,0,0,1,0,0
3 c=1,0,0,0,1,0,0,1,0,1,0,0
4 c=1,0,0,0,1,0,0,0,1,1,0,0
5 c=1,0,0,0,1,0,0,0,0,1,1,0
6 c=1,0,0,0,1,0,0,0,0,1,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375          :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8         :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0             :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625     :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625     :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625     :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625     :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625     :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38             :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38               :2L8x8x1/2

frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
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729 730 1 m=64
735 738 1 m=64
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
835 838 1 l=1,.001
859 862 1 l=1,.001
820       l=1,.001
871       l=1,.001
867 868 1 l=1,.001
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ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
501	T	(T)	.685	.257	.428	.000	80.02	2	(H2-1)	NON-COM
502	T	(T)	.684	.256	.428	.000	.00	2	(H2-1)	NON-COM
503	T	(T)	.871	.418	.453	.000	80.02	2	(H2-1)	NON-COM
504	T	(T)	.870	.417	.453	.000	.00	2	(H2-1)	NON-COM
505	T	(T)	.878	.516	.362	.000	80.02	2	(H2-1)	NON-COM
506	T	(T)	.878	.516	.362	.000	.00	2	(H2-1)	NON-COM
507	T	(T)	.824	.533	.291	.000	80.02	4	(H2-1)	NON-COM
508	T	(T)	.824	.533	.291	.000	.00	4	(H2-1)	NON-COM
509	T	(T)	.741	.539	.202	.000	80.02	4	(H2-1)	NON-COM
510	T	(T)	.741	.539	.202	.000	.00	4	(H2-1)	NON-COM
511	T	(T)	.644	.502	.142	.000	80.02	4	(H2-1)	NON-COM
512	T	(T)	.644	.501	.142	.000	.00	4	(H2-1)	NON-COM
513	T	(T)	.775	.479	.296	.000	80.02	2	(H2-1)	NON-COM
514	T	(T)	.775	.478	.296	.000	.00	2	(H2-1)	NON-COM
515	T	(T)	.827	.420	.407	.000	80.02	4	(H2-1)	NON-COM
516	T	(T)	.826	.419	.407	.000	.00	4	(H2-1)	NON-COM
517	T	(T)	.740	.304	.436	.000	80.02	4	(H2-1)	NON-COM
518	T	(T)	.740	.303	.436	.000	.00	4	(H2-1)	NON-COM
519	T	(T)	.586	.155	.431	.000	80.02	4	(H2-1)	NON-COM
520	T	(T)	.585	.154	.431	.000	.00	4	(H2-1)	NON-COM
521	T	(C)	.548	.112	.436	.000	80.02	2	(H1-3)	NON-COM
522	T	(C)	.566	.112	.454	.000	80.02	2	(H1-3)	NON-COM
523	T	(C)	.815	.340	.474	.000	.00	2	(H1-1)	NON-COM
524	T	(C)	.651	.340	.311	.000	.00	2	(H1-1)	NON-COM
525	T	(C)	.644	.362	.282	.000	80.02	2	(H1-1)	NON-COM

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ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
526	T	(C)	.795	.362	.433	.000	80.02	2	(H1-1)	NON-COM
527	T	(C)	.578	.156	.422	.000	.00	2	(H1-1)	NON-COM
528	T	(C)	.555	.156	.399	.000	.00	2	(H1-1)	NON-COM
529	T	(T)	.585	.154	.431	.000	80.02	4	(H2-1)	NON-COM
530	T	(T)	.586	.155	.431	.000	.00	4	(H2-1)	NON-COM
531	T	(T)	.740	.303	.436	.000	80.02	4	(H2-1)	NON-COM
532	T	(T)	.740	.304	.436	.000	.00	4	(H2-1)	NON-COM
533	T	(T)	.849	.430	.420	.000	80.02	6	(H2-1)	NON-COM
534	T	(T)	.850	.430	.420	.000	.00	6	(H2-1)	NON-COM
535	T	(T)	.825	.525	.300	.000	80.02	6	(H2-1)	NON-COM
536	T	(T)	.826	.526	.300	.000	.00	6	(H2-1)	NON-COM
537	T	(T)	.666	.529	.138	.000	80.02	6	(H2-1)	NON-COM
538	T	(T)	.666	.529	.138	.000	.00	6	(H2-1)	NON-COM
539	T	(T)	.773	.578	.194	.000	80.02	6	(H2-1)	NON-COM
540	T	(T)	.773	.578	.194	.000	.00	6	(H2-1)	NON-COM
541	T	(T)	.877	.583	.294	.000	80.02	6	(H2-1)	NON-COM
542	T	(T)	.877	.583	.294	.000	.00	6	(H2-1)	NON-COM
543	T	(T)	.929	.540	.389	.000	80.02	6	(H2-1)	NON-COM
544	T	(T)	.929	.541	.389	.000	.00	6	(H2-1)	NON-COM
545	T	(T)	.911	.434	.478	.000	80.02	6	(H2-1)	NON-COM
546	T	(T)	.912	.434	.478	.000	.00	6	(H2-1)	NON-COM
547	T	(T)	.709	.265	.444	.000	80.02	6	(H2-1)	NON-COM
548	T	(T)	.710	.265	.444	.000	.00	6	(H2-1)	NON-COM
552	G	(C)	.639	.498	.141	.000	160.00	2	(H1-1)	NON-COM
553	G	(C)	1.107	.867	.239	.000	.00	2	(H1-1)	NON-COM

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ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
554	G									NON-COM
		(C)	1.535	1.085	.450	.000	160.00	2	(H1-1)	
555	T									NON-COM
		(C)	1.097	.883	.214	.000	.00	2	(H1-1)	
556	T									NON-COM
		(C)	1.075	.860	.215	.000	160.00	2	(H1-1)	
557	T									NON-COM
		(C)	.751	.595	.156	.000	160.00	2	(H1-1)	
561	G									NON-COM
		(C)	.508	.423	.085	.000	160.00	1	(H1-1)	
		(T)	.706	.645	.061	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.744	.635	.109	.000	.00	1	(H1-1)	
		(T)	1.084	1.029	.054	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.751	.635	.115	.000	160.00	1	(H1-1)	
		(T)	1.084	1.029	.054	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.706	.645	.061	.000	160.00	4	(H2-1)	
568	T									NON-COM
		(C)	.625	.491	.133	.000	.00	6	(H1-1)	
569	T									NON-COM
		(C)	.914	.733	.181	.000	.00	6	(H1-1)	
570	T									NON-COM
		(C)	.909	.743	.166	.000	160.00	6	(H1-1)	
571	G									NON-COM
		(C)	1.157	.885	.272	.000	.00	6	(H1-1)	
572	G									NON-COM
		(C)	.814	.649	.165	.000	160.00	6	(H1-1)	
577	G									NON-COM
		(C)	1.067	1.067	.000	.000	.00	5	(H1-1)	
		(T)	.577	.577	.000	.000	.00	2	(H2-1)	
578	G			kl/r > 200						NON-COM
		(C)	1.072	1.072	.000	.000	.00	5	(H1-1)	
579	G			kl/r > 200						NON-COM
		(C)	.867	.867	.000	.000	.00	5	(H1-1)	
580	G			kl/r > 200						NON-COM
581	G			kl/r > 200						NON-COM
582	G			kl/r > 200						NON-COM
583	G			kl/r > 200						NON-COM
		(C)	1.232	1.232	.000	.000	.00	5	(H1-1)	
584	G			kl/r > 200						NON-COM
		(C)	1.968	1.968	.000	.000	.00	5	(H1-1)	
585	G			kl/r > 200						NON-COM
		(C)	1.748	1.748	.000	.000	.00	5	(H1-1)	
		(T)	.539	.539	.000	.000	.00	2	(H2-1)	
586	G			kl/r > 200						NON-COM
		(C)	1.609	1.609	.000	.000	.00	5	(H1-1)	

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587	G		kl/r > 200							NON-COM
		(C)	1.595	1.595	.000	.000	.00	5	(H1-1)	
		(T)	.589	.589	.000	.000	.00	4	(H2-1)	
588	W14X61									COMPACT
		(T)	.505	.505	.000	.000	50.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.389	1.389	.000	.000	.00	1	(H1-1)	
		(T)	.589	.589	.000	.000	.00	4	(H2-1)	
590	G		kl/r > 200							NON-COM
		(C)	1.394	1.394	.000	.000	.00	1	(H1-1)	
591	G		kl/r > 200							NON-COM
		(C)	1.515	1.515	.000	.000	.00	1	(H1-1)	
		(T)	.530	.530	.000	.000	.00	4	(H2-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.673	1.673	.000	.000	.00	1	(H1-1)	
593	G		kl/r > 200							NON-COM
		(C)	1.004	1.004	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
		(C)	.619	.619	.000	.000	.00	1	(H1-1)	
597	G		kl/r > 200							NON-COM
		(C)	1.016	1.016	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.164	1.164	.000	.000	.00	1	(H1-1)	
599	G									NON-COM
		(C)	1.118	1.118	.000	.000	.00	1	(H1-1)	
		(T)	.598	.598	.000	.000	.00	6	(H2-1)	
701	T									NON-COM
		(C)	1.548	1.366	.182	.000	113.14	2	(H1-1)	
702	T									NON-COM
		(C)	1.489	1.319	.170	.000	.00	2	(H1-1)	
703	T									NON-COM
		(C)	1.288	1.187	.100	.000	114.32	2	(H1-1)	
704	T									NON-COM
		(C)	1.241	1.144	.097	.000	.00	2	(H1-1)	
705	T									NON-COM
		(C)	2.313	1.199	1.113	.000	115.52	2	(H1-1)	
706	T									NON-COM
		(C)	1.732	1.098	.634	.000	.00	2	(H1-1)	
707	T									NON-COM
		(C)	.970	.711	.258	.000	116.73	4	(H1-1)	
708	T									NON-COM
		(C)	.832	.630	.202	.000	.00	4	(H1-1)	
713	T									NON-COM
		(C)	1.098	.824	.274	.000	.00	2	(H1-1)	
714	T									NON-COM
		(C)	1.189	.879	.310	.000	121.67	2	(H1-1)	
715	T		fa > Fe							NON-COM
716	T		fa > Fe							NON-COM

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717	T			fa > Fe						NON-COM
718	T			fa > Fe						NON-COM
719	T			fa > Fe						NON-COM
720	T			fa > Fe						NON-COM
721	T									NON-COM
		(C)	2.776	1.901	.875	.000	.00	4	(H1-1)	
		(T)	.501	.461	.040	.000	31.69	5	(H2-1)	
722	T									NON-COM
		(C)	2.764	1.898	.866	.000	126.77	4	(H1-1)	
723	T									NON-COM
		(C)	5.763	1.685	4.078	.000	.00	4	(H1-1)	
		(T)	.551	.506	.045	.000	32.02	5	(H2-1)	
724	T									NON-COM
		(C)	8.410	1.711	6.699	.000	128.06	4	(H1-1)	
		(T)	.553	.508	.045	.000	96.05	5	(H2-1)	
725	T									NON-COM
		(C)	8.410	1.711	6.699	.000	128.06	4	(H1-1)	
		(T)	.524	.478	.047	.000	96.05	1	(H2-1)	
726	T									NON-COM
		(C)	5.763	1.685	4.078	.000	.00	4	(H1-1)	
		(T)	.522	.476	.047	.000	32.02	1	(H2-1)	
727	T									NON-COM
		(C)	2.764	1.898	.866	.000	126.77	4	(H1-1)	
728	T									NON-COM
		(C)	2.776	1.901	.875	.000	.00	4	(H1-1)	
729	T			fa > Fe						NON-COM
730	T			fa > Fe						NON-COM
731	T			fa > Fe						NON-COM
732	T			fa > Fe						NON-COM
733	T			fa > Fe						NON-COM
734	T			fa > Fe						NON-COM
735	T									NON-COM
		(C)	1.093	.820	.273	.000	121.67	6	(H1-1)	
736	T									NON-COM
		(C)	1.011	.765	.246	.000	.00	6	(H1-1)	
741	T									NON-COM
		(C)	.832	.630	.202	.000	.00	4	(H1-1)	
742	T									NON-COM
		(C)	.970	.711	.258	.000	116.73	4	(H1-1)	
743	T									NON-COM
		(C)	2.274	1.190	1.084	.000	.00	6	(H1-1)	
744	T									NON-COM
		(C)	4.264	1.281	2.983	.000	115.52	6	(H1-1)	
745	T									NON-COM
		(C)	1.306	1.202	.105	.000	.00	6	(H1-1)	
746	T									NON-COM
		(C)	1.348	1.240	.108	.000	114.32	6	(H1-1)	
747	T									NON-COM
		(C)	1.554	1.367	.187	.000	.00	6	(H1-1)	

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748	T									NON-COM
		(C)	1.612	1.412	.200	.000	113.14	6	(H1-1)	
820	W18X76									COMPACT
		(C)	.531	.018	.513	.000	192.00	1	(H1-3)	
		(T)	.895	.134	.761	.000	192.00	4	(H2-1)	
835	W18X46									COMPACT
		(C)	1.406	.099	1.307	.000	.00	1	(H1-3)	
		(T)	1.272	.075	1.197	.000	.00	6	(H2-1)	
836	W18X46									COMPACT
		(C)	.815	.099	.716	.000	.00	1	(H1-3)	
		(T)	.689	.075	.614	.000	.00	6	(H2-1)	
837	W18X46									COMPACT
		(C)	.653	.099	.553	.000	78.00	1	(H1-3)	
		(T)	.541	.075	.466	.000	78.00	6	(H2-1)	
838	W18X46									COMPACT
		(C)	1.330	.099	1.231	.000	78.00	1	(H1-3)	
		(T)	1.038	.075	.963	.000	78.00	6	(H2-1)	
859	W24X68									COMPACT
		(C)	1.874	.037	1.837	.000	.00	5	(H1-3)	
		(T)	1.390	.022	1.368	.000	.00	1	(H2-1)	
860	W24X68									COMPACT
		(C)	.825	.037	.787	.000	.00	5	(H1-3)	
		(T)	.857	.022	.835	.000	.00	1	(H2-1)	
861	W24X68									COMPACT
		(C)	.905	.037	.868	.000	78.00	5	(H1-3)	
		(T)	.695	.022	.673	.000	78.00	1	(H2-1)	
862	W24X68									COMPACT
		(C)	1.511	.037	1.474	.000	78.00	5	(H1-3)	
		(T)	1.671	.022	1.649	.000	78.00	1	(H2-1)	
867	W18X65									COMPACT
		(C)	1.530	.148	1.383	.000	180.50	2	(H1-3)	
		(T)	1.509	.085	1.424	.000	180.50	5	(H2-1)	
868	W18X65									COMPACT
		(C)	.884	.044	.840	.000	.00	1	(H1-3)	
		(T)	.687	.027	.660	.000	160.50	5	(H2-1)	
871	W18X76									COMPACT
		(C)	1.742	.149	1.593	.000	180.50	5	(H1-2)	
		(T)	1.410	.156	1.254	.000	180.50	2	(H2-1)	
872	W18X76									COMPACT
		(T)	.683	.141	.543	.000	.00	6	(H2-1)	
873	W18X76									COMPACT
		(C)	.572	.076	.496	.000	.00	1	(H1-3)	
		(T)	.631	.172	.460	.000	.00	6	(H2-1)	

Truss T1 Hangars 44 and 45 **Maximum Wind**

C **SAP90 INPUT**

```
system
L=12
C
C
C
joints
C      Truss Joints T1
501  x=0     z=0           y=240
549  x=3840  z=0           y=240  g=501,549,2
551  x=0     z=160         y=240
575  x=1920  z=200         y=240  g=551,575,1
599  x=3840  z=160         y=240  g=575,599,1
602  x=80    z=80
612  x=880   z=88.333             g=602,612,2
614  x=1040  z=91.6667     y=240
624  x=1840  z=100         y=240  g=614,624,2
626  x=2000  z=100         y=240
636  x=2800  z=91.6667     y=240  g=626,636,2
638  x=2960  z=88.3333     y=240
648  x=3760  z=80          y=240  g=638,648,2
C      Bracing Frame Joints T1
667  x=0     z=-384    y=240
674  x=3840  z=-43     y=240
678  x=4152  z=-43     y=240  g=674,678,1
679  x=3840  z=-203.5  y=240
683  x=4152  z=-203.5  y=240  g=679,683,1
685  x=3840  z=-384    y=240
686  x=4152  z=-384    y=240

restraints
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501  523  2  r=0,1,0,0,0,0
527  549  2  r=0,1,0,0,0,0
551  599  1  r=0,1,0,0,0,0
674  678  1  r=0,1,0,0,0,0
679  683  1  r=0,1,0,0,0,0

frame
nm=56 nl=18 z=-1,0,0,0,0,0,0,0,0,0,0,0
1  sh=w18x76               w=.006333   E=29000
2  sh=218x6x1/2-3          w=.0038333
3  sh=216x6x3/8-3          w=.00248333
4  sh=213x3.5x5/16-3       w=.0011
5  sh=213x3x1/4-3          w=.00081667
6  sh=216x3.5x5/16-3       w=.0016333
7  sh=213x3x5/16-3         w=.00101667
8  sh=2L3.5X2.5X5/16-3     w=.001008333
9  sh=213x2.5x1/4-3        w=.00075
10 sh=213x2x5/16-3         w=.0008333
```

```
11 sh=216x6x1/2-3        w=.0030667
12 sh=218x6x1/2-3        w=.0038333
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
C      Live Load on braced frames
1 wg=0,0,-.1667      :100 psf---T1
C      Slab load on braced frames
2 wg=0,0,-.08333     :150pcfx4 in. ---T1
C       Roof Dead Loads
3 wg=0,0,-.005
C       Roof Live Loads
4 wg=0,0,-.033333
C       Wind Span Loads
5  wg=.09667,0,0
6  wg=.101667,0,0
```

```
7  wg=.006667,0,0
8  wg=-.02333,0,0
9  wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
14 wg=-.09667,0,0
15 wg=-.101667,0,0
16 wg=-.006667,0,0
17 wg=.02333,0,0
18 wg=-.12,0,0
C          Truss Elements T1-b
588  525  575  m=42 lp=2,0
C               Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=2,0 lr=1,0,0,0,0,0
552  503  505  m=3  lp=2,0
553  505  507  m=3  lp=2,0
554  507  509  m=3  lp=2,0
555  509  511  m=11 lp=2,0
556  511  513  m=11 lp=2,0
557  513  515  m=11 lp=2,0
558  515  517  m=11 lp=2,0
559  517  519  m=3  lp=2,0
560  519  521  m=3  lp=2,0
561  521  523  m=3  lp=2,0
562  523  525  m=3  lp=2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=2,0
565  529  531  m=3  lp=2,0
566  531  533  m=3  lp=2,0
567  533  535  m=11 lp=2,0
568  535  537  m=11 lp=2,0
569  537  539  m=11 lp=2,0
570  539  541  m=11 lp=2,0
571  541  543  m=3  lp=2,0
572  543  545  m=3  lp=2,0
573  545  547  m=3  lp=2,0
574  547  549  m=3  lp=2,0  lr=0,1,0,0,0,0
C              Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0     lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0     lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0     lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0     lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0     lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0     lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0    lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0    lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0    lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0    lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0    lr=0,1,0,0,0,0
723  624  523  m=16 lp=-2,0    lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0     lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0     lr=0,1,0,0,0,0
730  630  531  m=13 lp=2,0     lr=0,1,0,0,0,0
732  632  533  m=8  lp=2,0     lr=0,1,0,0,0,0
734  634  535  m=10 lp=2,0     lr=0,1,0,0,0,0
```

```
736   636   537   m=13  lp=2,0       lr=0,1,0,0,0,0
737   638   537   m=13  lp=-2,0      lr=0,1,0,0,0,0
739   640   539   m=10  lp=-2,0      lr=0,1,0,0,0,0
741   642   541   m=9   lp=-2,0      lr=0,1,0,0,0,0
743   644   543   m=8   lp=-2,0      lr=0,1,0,0,0,0
745   646   545   m=7   lp=-2,0      lr=0,1,0,0,0,0
747   648   547   m=4   lp=-2,0      lr=0,1,0,0,0,0
C                   Main Diagonal Top section
701   551   602   m=4   lp=2,0        lr=1,0,0,0,0,0
703   553   604   m=7   lp=2,0        lr=1,0,0,0,0,0
705   555   606   m=8   lp=2,0        lr=1,0,0,0,0,0
707   557   608   m=9   lp=2,0        lr=1,0,0,0,0,0
709   559   610   m=10  lp=2,0        lr=1,0,0,0,0,0
711   561   612   m=13  lp=2,0        lr=1,0,0,0,0,0
714   565   614   m=13  lp=-2,0       lr=1,0,0,0,0,0
716   567   616   m=10  lp=-2,0       lr=1,0,0,0,0,0
718   569   618   m=8   lp=-2,0       lr=1,0,0,0,0,0
720   571   620   m=13  lp=-2,0       lr=1,0,0,0,0,0
722   573   622   m=15  lp=-2,0       lr=1,0,0,0,0,0
724   575   624   m=16  lp=-2,0       lr=1,0,0,0,0,0
725   575   626   m=16  lp=2,0        lr=1,0,0,0,0,0
727   577   628   m=15  lp=2,0        lr=1,0,0,0,0,0
729   579   630   m=13  lp=2,0        lr=1,0,0,0,0,0
731   581   632   m=8   lp=2,0        lr=1,0,0,0,0,0
733   583   634   m=10  lp=2,0        lr=1,0,0,0,0,0
735   585   636   m=13  lp=2,0        lr=1,0,0,0,0,0
738   589   638   m=13  lp=-2,0       lr=1,0,0,0,0,0
740   591   640   m=10  lp=-2,0       lr=1,0,0,0,0,0
742   593   642   m=9   lp=-2,0       lr=1,0,0,0,0,0
744   595   644   m=8   lp=-2,0       lr=1,0,0,0,0,0
746   597   646   m=7   lp=-2,0       lr=1,0,0,0,0,0
748   599   648   m=4   lp=-2,0       lr=1,0,0,0,0,0
C                 Diagonal Brace
626   553   602   m=5   lp=2,0        lr=1,1,0,0,0,0
627   555   604   m=5   lp=2,0        lr=1,1,0,0,0,0
628   557   606   m=5   lp=2,0        lr=1,1,0,0,0,0
629   559   608   m=5   lp=2,0        lr=1,1,0,0,0,0
630   561   610   m=5   lp=2,0        lr=1,1,0,0,0,0
631   563   612   m=5   lp=2,0        lr=1,1,0,0,0,0
632   563   614   m=5   lp=-2,0       lr=1,1,0,0,0,0
633   565   616   m=5   lp=-2,0       lr=1,1,0,0,0,0
634   567   618   m=5   lp=-2,0       lr=1,1,0,0,0,0
635   569   620   m=5   lp=-2,0       lr=1,1,0,0,0,0
636   571   622   m=5   lp=-2,0       lr=1,1,0,0,0,0
637   573   624   m=5   lp=-2,0       lr=1,1,0,0,0,0
638   577   626   m=5   lp=2,0        lr=1,1,0,0,0,0
639   579   628   m=5   lp=2,0        lr=1,1,0,0,0,0
640   581   630   m=5   lp=2,0        lr=1,1,0,0,0,0
641   583   632   m=5   lp=2,0        lr=1,1,0,0,0,0
642   585   634   m=5   lp=2,0        lr=1,1,0,0,0,0
643   587   636   m=5   lp=2,0        lr=1,1,0,0,0,0
644   587   638   m=5   lp=-2,0       lr=1,1,0,0,0,0
645   589   640   m=5   lp=-2,0       lr=1,1,0,0,0,0
646   591   642   m=5   lp=-2,0       lr=1,1,0,0,0,0
647   593   644   m=5   lp=-2,0       lr=1,1,0,0,0,0
648   595   646   m=5   lp=-2,0       lr=1,1,0,0,0,0
649   597   648   m=5   lp=-2,0       lr=1,1,0,0,0,0
```

```
C                   Vertical Brace
601   602   552   m=5   lp=2,0          lr=1,1,0,0,0,0
602   604   554   m=5   lp=2,0          lr=1,1,0,0,0,0
603   606   556   m=5   lp=2,0          lr=1,1,0,0,0,0
604   608   558   m=5   lp=2,0          lr=1,1,0,0,0,0
605   610   560   m=5   lp=2,0          lr=1,1,0,0,0,0
606   612   562   m=5   lp=2,0          lr=1,1,0,0,0,0
607   614   564   m=5   lp=2,0          lr=1,1,0,0,0,0
608   616   566   m=5   lp=2,0          lr=1,1,0,0,0,0
609   618   568   m=5   lp=2,0          lr=1,1,0,0,0,0
610   620   570   m=5   lp=2,0          lr=1,1,0,0,0,0
611   622   572   m=5   lp=2,0          lr=1,1,0,0,0,0
612   624   574   m=5   lp=2,0          lr=1,1,0,0,0,0
613   626   576   m=5   lp=-2,0         lr=1,1,0,0,0,0
614   628   578   m=5   lp=-2,0         lr=1,1,0,0,0,0
615   630   580   m=5   lp=-2,0         lr=1,1,0,0,0,0
616   632   582   m=5   lp=-2,0         lr=1,1,0,0,0,0
617   634   584   m=5   lp=-2,0         lr=1,1,0,0,0,0
618   636   586   m=5   lp=-2,0         lr=1,1,0,0,0,0
619   638   588   m=5   lp=-2,0         lr=1,1,0,0,0,0
620   640   590   m=5   lp=-2,0         lr=1,1,0,0,0,0
621   642   592   m=5   lp=-2,0         lr=1,1,0,0,0,0
622   644   594   m=5   lp=-2,0         lr=1,1,0,0,0,0
623   646   596   m=5   lp=-2,0         lr=1,1,0,0,0,0
624   648   598   m=5   lp=-2,0         lr=1,1,0,0,0,0
C                     Top Chord (3 axis ------)
501   551   552   m=2   lp=-2,0         lr=1,0,0,0,0,0
502   552   553   m=2   lp=-2,0
503   553   554   m=2   lp=-2,0
504   554   555   m=2   lp=-2,0
505   555   556   m=2   lp=-2,0
506   556   557   m=2   lp=-2,0
507   557   558   m=2   lp=-2,0
508   558   559   m=2   lp=-2,0
509   559   560   m=12  lp=-2,0
510   560   561   m=12  lp=-2,0
511   561   562   m=12  lp=-2,0
512   562   563   m=12  lp=-2,0
513   563   564   m=12  lp=-2,0
514   564   565   m=12  lp=-2,0
515   565   566   m=12  lp=-2,0
516   566   567   m=12  lp=-2,0
517   567   568   m=2   lp=-2,0
518   568   569   m=2   lp=-2,0
519   569   570   m=2   lp=-2,0
520   570   571   m=2   lp=-2,0
521   571   572   m=2   lp=-2,0
522   572   573   m=2   lp=-2,0
523   573   574   m=2   lp=-2,0
524   574   575   m=2   lp=-2,0        lr=0,1,0,0,0,0
525   575   576   m=2   lp=-2,0        lr=1,0,0,0,0,0
526   576   577   m=2   lp=-2,0
527   577   578   m=2   lp=-2,0
528   578   579   m=2   lp=-2,0
529   579   580   m=2   lp=-2,0
530   580   581   m=2   lp=-2,0
531   581   582   m=2   lp=-2,0
```

```
532  582  583  m=2  lp=-2,0
533  583  584  m=12 lp=-2,0
534  584  585  m=12 lp=-2,0
535  585  586  m=12 lp=-2,0
536  586  587  m=12 lp=-2,0
537  587  588  m=12 lp=-2,0
538  588  589  m=12 lp=-2,0
539  589  590  m=12 lp=-2,0
540  590  591  m=12 lp=-2,0
541  591  592  m=2  lp=-2,0
542  592  593  m=2  lp=-2,0
543  593  594  m=2  lp=-2,0
544  594  595  m=2  lp=-2,0
545  595  596  m=2  lp=-2,0
546  596  597  m=2  lp=-2,0
547  597  598  m=2  lp=-2,0
548  598  599  m=2  lp=-2,0      lr=0,1,0,0,0,0
C              South Vertical Member
576  501  551  m=1  lp=2,0   nsl=0,0,6,8,0,0,0,10,12,0,16,18 \
                                 lr=1,1,0,0,0,0
577  503  553  m=6  lp=2,0       lr=1,1,0,0,0,0
578  505  555  m=6  lp=2,0       lr=1,1,0,0,0,0
579  507  557  m=6  lp=2,0       lr=1,1,0,0,0,0
580  509  559  m=6  lp=2,0       lr=1,1,0,0,0,0
581  511  561  m=6  lp=2,0       lr=1,1,0,0,0,0
582  513  563  m=6  lp=2,0       lr=1,1,0,0,0,0
583  515  565  m=6  lp=2,0       lr=1,1,0,0,0,0
584  517  567  m=6  lp=2,0       lr=1,1,0,0,0,0
585  519  569  m=6  lp=2,0       lr=1,1,0,0,0,0
586  521  571  m=14 lp=2,0       lr=1,1,0,0,0,0
587  523  573  m=14 lp=2,0       lr=1,1,0,0,0,0
589  527  577  m=14 lp=-2,0      lr=1,1,0,0,0,0
590  529  579  m=14 lp=-2,0      lr=1,1,0,0,0,0
591  531  581  m=6  lp=-2,0      lr=1,1,0,0,0,0
592  533  583  m=6  lp=-2,0      lr=1,1,0,0,0,0
593  535  585  m=6  lp=-2,0      lr=1,1,0,0,0,0
594  537  587  m=6  lp=-2,0      lr=1,1,0,0,0,0
595  539  589  m=6  lp=-2,0      lr=1,1,0,0,0,0
596  541  591  m=6  lp=-2,0      lr=1,1,0,0,0,0
597  543  593  m=6  lp=-2,0      lr=1,1,0,0,0,0
598  545  595  m=6  lp=-2,0      lr=1,1,0,0,0,0
599  547  597  m=6  lp=-2,0      lr=1,1,0,0,0,0
600  549  599  m=1  lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17 \
                                 lr=1,1,0,0,0,0
C      Bracing Frame Elements
820  667  501  m=1  lp=2,0   nsl=0,0,5,8,0,0,0,10,12,0,16,18
835  674  675  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
836  675  676  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
837  676  677  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
838  677  678  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
859  679  680  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
860  680  681  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
861  681  682  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
862  682  683  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
867  686  683  m=20 lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17
868  683  678  m=20 lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17
871  685  679  m=1  lp=2,0
```

```
872  679  674  m=1  lp=2,0
873  674  549  m=1  lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17

loads
C Dead Loads
551 599 48  l=1 f=0,0,-.752
552 554  1  l=1 f=0,0,-1.474
555         l=1 f=0,0,-1.664
556 558 1   l=1 f=0,0,-1.474
559         l=1 f=0,0,-1.664
560 562 1   l=1 f=0,0,-1.474
563         l=1 f=0,0,-1.904
564 566 1   l=1 f=0,0,-1.474
567         l=1 f=0,0,-1.664
568 570 1   l=1 f=0,0,-1.474
571         l=1 f=0,0,-1.664
572 574 1   l=1 f=0,0,-1.474
575         l=1 f=0,0,-2.920
576 578 1   l=1 f=0,0,-1.474
579         l=1 f=0,0,-1.664
580 582 1   l=1 f=0,0,-1.474
583         l=1 f=0,0,-1.664
584 586 1   l=1 f=0,0,-1.474
587         l=1 f=0,0,-1.904
588 590 1   l=1 f=0,0,-1.474
591         l=1 f=0,0,-1.664
592 594 1   l=1 f=0,0,-1.474
595         l=1 f=0,0,-1.664
596 598 1   l=1 f=0,0,-1.474
551 599 48  l=1 f=0,0,-.347
555 559 4   l=1 f=0,0,-.557
563 587 24  l=1 f=0,0,-.322
567 571 4   l=1 f=0,0,-.557
575         l=1 f=0,0,-.163
579 583 4   l=1 f=0,0,-.557
591 595 4   l=1 f=0,0,-.557
509 517 8   l=1 f=0,0,-.355
533 541 8   l=1 f=0,0,-.355
C Live Loads
501 549 48  l=2 f=0,0,-1.066
503 523 2   l=2 f=0,0,-2.133
C Wind I
557        l=3 f=4,0,0
551        l=3 f=0,0,1.73
552 557 1  l=3 f=0,0,3.47
558        l=3 f=0,0,1.67
559 564 1  l=3 f=0,0,1.06
565 598 1  l=3 f=0,0,-.4
599        l=3 f=0,0,-.2
C Wind II
557        l=4 f=-.9,0,0
551        l=4 f=0,0,6.27
552 557 1  l=4 f=0,0,12.53
558        l=4 f=0,0,10.73
559 564 1  l=4 f=0,0,10.13
565 598 1  l=4 f=0,0,8.67
599        l=4 f=0,0,4.33
```

```
C Point Loads
503 523 2    l=5 f=0,0,-.5
527 547 2    l=5 f=0,0,-.5
C Roof Live Loads
551 599 48   l=6 f=0,0,-1.3333
552 598 1    l=6 f=0,0,-2.66667
C Crane Dead Loads for Down Force
527 547 20   l=7 f=0,0,-2.6
529 545 4    l=7 f=0,0,-2.6
527 547 20   l=7 f=0,0,-.773
529 545 16   l=7 f=0,0,-1.6
533 541 8    l=7 f=0,0,-2.134
505 523 18   l=7 f=0,0,-.552
511 517 6    l=7 f=0,0,-.960
C Wind III
551          l=8 f=0,0,1.93
552 557 1    l=8 f=0,0,3.87
558          l=8 f=0,0,3.87
559 564 1    l=8 f=0,0,3.87
565 598 1    l=8 f=0,0,3.87
599          l=8 f=0,0,1.93
C Wind IV
551          l=9 f=0,0,6.4
552 557 1    l=9 f=0,0,12.8
558          l=9 f=0,0,12.8
559 564 1    l=9 f=0,0,12.8
565 598 1    l=9 f=0,0,12.8
599          l=9 f=0,0,6.4
C Crane Dead Loads for Uplift
505 523 6    l=10 f=0,0,-.333
527 545 6    l=10 f=0,0,-.333
C Wind I - Reverse Direction
593          l=11 f=-4,0,0
599          l=11 f=0,0,1.73
593 598 1    l=11 f=0,0,3.47
592          l=11 f=0,0,1.67
586 591 1    l=11 f=0,0,1.06
552 585 1    l=11 f=0,0,-.4
551          l=11 f=0,0,-.2
C Wind II - Reverse Direction
593          l=12 f=.9,0,0
599          l=12 f=0,0,6.27
593 598 1    l=12 f=0,0,12.53
592          l=12 f=0,0,10.73
586 591 1    l=12 f=0,0,10.13
552 585 1    l=12 f=0,0,8.67
551          l=12 f=0,0,4.33
```

Truss T1 Hangars 44 and 45 **Maximum Wind**

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,1,0,0,0,0,0
2 c=1,0,0,1,1,0,0,0,0,1,0,0
3 c=1,0,0,0,1,0,0,1,0,1,0,0
4 c=1,0,0,0,1,0,0,0,1,1,0,0
5 c=1,0,0,0,1,0,1,0,0,0,1,0
6 c=1,0,0,0,1,0,0,0,0,1,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375          :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04    t=9.23,10.8        :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0             :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625     :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625     :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625     :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625     :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625   :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625     :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38             :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38               :2L8x8x1/2

frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
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729 730 1 m=64
735 738 1 m=64
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
835 838 1 l=1,.001
859 862 1 l=1,.001
820       l=1,.001
871       l=1,.001
867 868 1 l=1,.001
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Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
501	T	(T)	.844	.335	.508	.000	80.02	4	(H2-1)	NON-COM
502	T	(T)	.843	.335	.508	.000	.00	4	(H2-1)	NON-COM
503	T	(T)	1.098	.537	.560	.000	80.02	4	(H2-1)	NON-COM
504	T	(T)	1.097	.537	.560	.000	.00	4	(H2-1)	NON-COM
505	T	(T)	1.152	.675	.477	.000	80.02	4	(H2-1)	NON-COM
506	T	(T)	1.151	.675	.477	.000	.00	4	(H2-1)	NON-COM
507	T	(T)	1.141	.742	.399	.000	80.02	4	(H2-1)	NON-COM
508	T	(T)	1.140	.742	.399	.000	.00	4	(H2-1)	NON-COM
509	T	(T)	1.018	.748	.270	.000	80.02	4	(H2-1)	NON-COM
510	T	(T)	1.017	.748	.270	.000	.00	4	(H2-1)	NON-COM
511	T	(T)	.878	.691	.187	.000	80.02	4	(H2-1)	NON-COM
512	T	(T)	.878	.691	.187	.000	.00	4	(H2-1)	NON-COM
513	T	(T)	1.074	.687	.387	.000	80.02	4	(H2-1)	NON-COM
514	T	(T)	1.073	.687	.387	.000	.00	4	(H2-1)	NON-COM
515	T	(T)	1.146	.569	.577	.000	80.02	4	(H2-1)	NON-COM
516	T	(T)	1.145	.568	.577	.000	.00	4	(H2-1)	NON-COM
517	T	(T)	1.018	.398	.620	.000	80.02	4	(H2-1)	NON-COM
518	T	(T)	1.017	.397	.620	.000	.00	4	(H2-1)	NON-COM
519	T	(T)	.789	.179	.610	.000	80.02	4	(H2-1)	NON-COM
520	T	(T)	.788	.178	.610	.000	.00	4	(H2-1)	NON-COM
521	T	(C)	.767	.101	.666	.000	80.02	4	(H1-3)	NON-COM
522	T	(C)	.801	.102	.700	.000	80.02	4	(H1-3)	NON-COM
523	T	(C)	1.181	.440	.741	.000	.00	4	(H1-1)	NON-COM
524	T	(C)	.931	.440	.491	.000	.00	4	(H1-1)	NON-COM
525	T	(C)	.931	.440	.491	.000	80.02	4	(H1-1)	NON-COM

Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
526	T									NON-COM
		(C)	1.181	.440	.741	.000	80.02	4	(H1-1)	
527	T									NON-COM
		(C)	.801	.102	.700	.000	.00	4	(H1-3)	
528	T									NON-COM
		(C)	.767	.101	.666	.000	.00	4	(H1-3)	
529	T									NON-COM
		(T)	.788	.178	.610	.000	80.02	4	(H2-1)	
530	T									NON-COM
		(T)	.789	.179	.610	.000	.00	4	(H2-1)	
531	T									NON-COM
		(C)	.536	.296	.240	.000	80.02	1	(H1-1)	
		(T)	1.017	.397	.620	.000	80.02	4	(H2-1)	
532	T									NON-COM
		(C)	.536	.296	.240	.000	.00	1	(H1-1)	
		(T)	1.018	.398	.620	.000	.00	4	(H2-1)	
533	T									NON-COM
		(C)	.560	.357	.203	.000	80.02	1	(H1-1)	
		(T)	1.145	.568	.577	.000	80.02	4	(H2-1)	
534	T									NON-COM
		(C)	.560	.357	.203	.000	.00	1	(H1-1)	
		(T)	1.146	.569	.577	.000	.00	4	(H2-1)	
535	T									NON-COM
		(C)	.544	.401	.143	.000	80.02	1	(H1-1)	
		(T)	1.073	.687	.387	.000	80.02	4	(H2-1)	
536	T									NON-COM
		(C)	.544	.401	.143	.000	.00	1	(H1-1)	
		(T)	1.074	.687	.387	.000	.00	4	(H2-1)	
537	T									NON-COM
		(T)	.878	.691	.187	.000	80.02	4	(H2-1)	
538	T									NON-COM
		(T)	.878	.691	.187	.000	.00	4	(H2-1)	
539	T									NON-COM
		(C)	.527	.413	.114	.000	80.02	1	(H1-1)	
		(T)	1.017	.748	.270	.000	80.02	4	(H2-1)	
540	T									NON-COM
		(C)	.527	.413	.114	.000	.00	1	(H1-1)	
		(T)	1.018	.748	.270	.000	.00	4	(H2-1)	
541	T									NON-COM
		(C)	.594	.401	.192	.000	80.02	1	(H1-1)	
		(T)	1.140	.742	.399	.000	80.02	4	(H2-1)	
542	T									NON-COM
		(C)	.594	.402	.192	.000	.00	1	(H1-1)	
		(T)	1.141	.742	.399	.000	.00	4	(H2-1)	
543	T									NON-COM
		(C)	.560	.350	.210	.000	80.02	1	(H1-1)	
		(T)	1.151	.675	.477	.000	80.02	4	(H2-1)	
544	T									NON-COM
		(C)	.560	.350	.210	.000	.00	1	(H1-1)	
		(T)	1.152	.675	.477	.000	.00	4	(H2-1)	

Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
545	T									NON-COM
		(C)	.523	.273	.249	.000	80.02	1	(H1-1)	
		(T)	1.097	.537	.560	.000	80.02	4	(H2-1)	
546	T									NON-COM
		(C)	.523	.274	.249	.000	.00	1	(H1-1)	
		(T)	1.098	.537	.560	.000	.00	4	(H2-1)	
547	T									NON-COM
		(T)	.843	.335	.508	.000	80.02	4	(H2-1)	
548	T									NON-COM
		(T)	.844	.335	.508	.000	.00	4	(H2-1)	
552	G									NON-COM
		(C)	.639	.498	.141	.000	160.00	2	(H1-1)	
553	G									NON-COM
		(C)	1.107	.867	.239	.000	.00	2	(H1-1)	
554	G									NON-COM
		(C)	1.737	1.122	.615	.000	160.00	4	(H1-1)	
555	T									NON-COM
		(C)	1.278	.968	.310	.000	.00	4	(H1-1)	
556	T									NON-COM
		(C)	1.318	.973	.345	.000	160.00	4	(H1-1)	
557	T									NON-COM
		(C)	.892	.677	.215	.000	160.00	4	(H1-1)	
558	T									NON-COM
		(C)	.539	.387	.152	.000	.00	4	(H1-1)	
561	G									NON-COM
		(C)	.623	.525	.098	.000	160.00	1	(H1-1)	
		(T)	.968	.893	.075	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.883	.750	.132	.000	.00	1	(H1-1)	
		(T)	1.520	1.455	.065	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.898	.750	.148	.000	160.00	1	(H1-1)	
		(T)	1.520	1.455	.065	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(C)	.501	.405	.096	.000	.00	1	(H1-1)	
		(T)	.968	.893	.075	.000	160.00	4	(H2-1)	
567	T									NON-COM
		(C)	.539	.387	.152	.000	160.00	4	(H1-1)	
568	T									NON-COM
		(C)	.892	.677	.215	.000	.00	4	(H1-1)	
569	T									NON-COM
		(C)	1.318	.973	.345	.000	.00	4	(H1-1)	
570	T									NON-COM
		(C)	1.278	.968	.310	.000	160.00	4	(H1-1)	
571	G									NON-COM
		(C)	1.737	1.122	.615	.000	.00	4	(H1-1)	
572	G									NON-COM
		(C)	1.050	.816	.234	.000	160.00	4	(H1-1)	

Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
577	G									NON-COM
		(C)	1.037	1.037	.000	.000	.00	5	(H1-1)	
		(T)	.687	.687	.000	.000	.00	4	(H2-1)	
578	G		kl/r > 200							NON-COM
		(C)	1.020	1.020	.000	.000	.00	5	(H1-1)	
		(T)	.505	.505	.000	.000	.00	4	(H2-1)	
579	G		kl/r > 200							NON-COM
		(C)	.803	.803	.000	.000	.00	5	(H1-1)	
580	G		kl/r > 200							NON-COM
581	G		kl/r > 200							NON-COM
582	G		kl/r > 200							NON-COM
583	G		kl/r > 200							NON-COM
		(C)	1.339	1.339	.000	.000	.00	5	(H1-1)	
584	G		kl/r > 200							NON-COM
		(C)	2.089	2.089	.000	.000	.00	5	(H1-1)	
		(T)	.624	.624	.000	.000	.00	4	(H2-1)	
585	G		kl/r > 200							NON-COM
		(C)	1.868	1.868	.000	.000	.00	5	(H1-1)	
		(T)	.772	.772	.000	.000	.00	4	(H2-1)	
586	G		kl/r > 200							NON-COM
		(C)	1.698	1.698	.000	.000	.00	5	(H1-1)	
		(T)	.728	.728	.000	.000	.00	4	(H2-1)	
587	G		kl/r > 200							NON-COM
		(C)	1.671	1.671	.000	.000	.00	5	(H1-1)	
		(T)	.855	.855	.000	.000	.00	4	(H2-1)	
588	W14X61									COMPACT
		(T)	.739	.739	.000	.000	50.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.790	1.790	.000	.000	.00	1	(H1-1)	
		(T)	.855	.855	.000	.000	.00	4	(H2-1)	
590	G		kl/r > 200							NON-COM
		(C)	1.698	1.698	.000	.000	.00	1	(H1-1)	
		(T)	.728	.728	.000	.000	.00	4	(H2-1)	
591	G		kl/r > 200							NON-COM
		(C)	1.931	1.931	.000	.000	.00	1	(H1-1)	
		(T)	.772	.772	.000	.000	.00	4	(H2-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.926	1.926	.000	.000	.00	1	(H1-1)	
		(T)	.624	.624	.000	.000	.00	4	(H2-1)	
593	G		kl/r > 200							NON-COM
		(C)	1.232	1.232	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
		(C)	.544	.544	.000	.000	.00	1	(H1-1)	
597	G		kl/r > 200							NON-COM
		(C)	1.256	1.256	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.357	1.357	.000	.000	.00	1	(H1-1)	
		(T)	.505	.505	.000	.000	.00	4	(H2-1)	

Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
599	G									NON-COM
		(C)	1.414	1.414	.000	.000	.00	1	(H1-1)	
		(T)	.687	.687	.000	.000	.00	4	(H2-1)	
701	T									NON-COM
		(C)	1.944	1.614	.330	.000	113.14	4	(H1-1)	
702	T									NON-COM
		(C)	1.876	1.574	.302	.000	.00	4	(H1-1)	
703	T									NON-COM
		(C)	1.620	1.467	.153	.000	114.32	4	(H1-1)	
704	T									NON-COM
		(C)	1.590	1.441	.149	.000	.00	4	(H1-1)	
705	T		fa > Fe							NON-COM
706	T		fa > Fe							NON-COM
707	T									NON-COM
		(C)	46.356	.998	45.357	.000	116.73	4	(H1-1)	
708	T									NON-COM
		(C)	1.656	.881	.775	.000	.00	4	(H1-1)	
713	T									NON-COM
		(C)	1.432	.963	.469	.000	.00	4	(H1-1)	
714	T									NON-COM
		(C)	1.634	1.038	.596	.000	121.67	4	(H1-1)	
715	T		fa > Fe							NON-COM
716	T		fa > Fe							NON-COM
717	T		fa > Fe							NON-COM
718	T		fa > Fe							NON-COM
719	T		fa > Fe							NON-COM
720	T		fa > Fe							NON-COM
721	T		fa > Fe							NON-COM
722	T		fa > Fe							NON-COM
723	T		fa > Fe							NON-COM
724	T		fa > Fe							NON-COM
725	T		fa > Fe							NON-COM
726	T		fa > Fe							NON-COM
727	T		fa > Fe							NON-COM
728	T		fa > Fe							NON-COM
729	T		fa > Fe							NON-COM
730	T		fa > Fe							NON-COM
731	T		fa > Fe							NON-COM
732	T		fa > Fe							NON-COM
733	T		fa > Fe							NON-COM
734	T		fa > Fe							NON-COM
735	T									NON-COM
		(C)	1.634	1.038	.596	.000	121.67	4	(H1-1)	
736	T									NON-COM
		(C)	1.432	.963	.469	.000	.00	4	(H1-1)	
741	T									NON-COM
		(C)	1.656	.881	.775	.000	.00	4	(H1-1)	
742	T									NON-COM
		(C)	46.319	.998	45.321	.000	116.73	4	(H1-1)	
743	T		fa > Fe							NON-COM

Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
744	T		fa > Fe							NON-COM
745	T									NON-COM
		(C)	1.590	1.441	.149	.000	.00	4	(H1-1)	
746	T									NON-COM
		(C)	1.620	1.467	.153	.000	114.32	4	(H1-1)	
747	T									NON-COM
		(C)	1.876	1.574	.302	.000	.00	4	(H1-1)	
		(T)	.563	.543	.020	.000	56.57	1	(H2-1)	
748	T									NON-COM
		(C)	1.944	1.614	.330	.000	113.14	4	(H1-1)	
		(T)	.561	.541	.020	.000	56.57	1	(H2-1)	
820	W18X76									COMPACT
		(C)	.529	.016	.513	.000	192.00	1	(H1-3)	
		(T)	.955	.194	.761	.000	192.00	4	(H2-1)	
835	W18X46									COMPACT
		(C)	1.407	.099	1.308	.000	.00	1	(H1-3)	
		(T)	1.272	.075	1.197	.000	.00	6	(H2-1)	
836	W18X46									COMPACT
		(C)	.815	.099	.716	.000	.00	1	(H1-3)	
		(T)	.689	.075	.614	.000	.00	6	(H2-1)	
837	W18X46									COMPACT
		(C)	.653	.099	.554	.000	78.00	1	(H1-3)	
		(T)	.541	.075	.466	.000	78.00	6	(H2-1)	
838	W18X46									COMPACT
		(C)	1.331	.099	1.232	.000	78.00	1	(H1-3)	
		(T)	1.038	.075	.963	.000	78.00	6	(H2-1)	
859	W24X68									COMPACT
		(C)	1.874	.037	1.837	.000	.00	5	(H1-3)	
		(T)	1.389	.022	1.368	.000	.00	1	(H2-1)	
860	W24X68									COMPACT
		(C)	.825	.037	.788	.000	.00	5	(H1-3)	
		(T)	.857	.022	.835	.000	.00	1	(H2-1)	
861	W24X68									COMPACT
		(C)	.905	.037	.868	.000	78.00	5	(H1-3)	
		(T)	.695	.022	.673	.000	78.00	1	(H2-1)	
862	W24X68									COMPACT
		(C)	1.511	.037	1.474	.000	78.00	5	(H1-3)	
		(T)	1.671	.022	1.649	.000	78.00	1	(H2-1)	
867	W18X65									COMPACT
		(C)	1.530	.148	1.383	.000	180.50	2	(H1-3)	
		(T)	1.509	.085	1.424	.000	180.50	5	(H2-1)	
868	W18X65									COMPACT
		(C)	.884	.044	.840	.000	.00	1	(H1-3)	
		(T)	.687	.027	.660	.000	160.50	5	(H2-1)	
871	W18X76									COMPACT
		(C)	1.765	.173	1.593	.000	180.50	5	(H1-2)	
		(T)	1.410	.156	1.254	.000	180.50	2	(H2-1)	
872	W18X76									COMPACT
		(T)	.683	.141	.543	.000	.00	6	(H2-1)	

Truss T1 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
873	W18X76									COMPACT
		(C)	.597	.101	.496	.000	.00	1	(H1-3)	
		(T)	.631	.172	.460	.000	.00	6	(H2-1)	

Truss T1 Hangars 43 and 47 **Average Wind**

```
C
C SAP90 INPUT
C
system
L=10
C
C
C
joints
C     Truss Joints T1
501  x=0    z=0         y=240
549  x=3840 z=0         y=240 g=501,549,2
551  x=0    z=160       y=240
575  x=1920 z=200       y=240 g=551,575,1
599  x=3840 z=160       y=240 g=575,599,1
602  x=80   z=80
612  x=880  z=88.333          g=602,612,2
614  x=1040 z=91.6667   y=240
624  x=1840 z=100       y=240 g=614,624,2
626  x=2000 z=100       y=240
636  x=2800 z=91.6667   y=240 g=626,636,2
638  x=2960 z=88.3333   y=240
648  x=3760 z=80        y=240 g=638,648,2
C     Bracing Frame Joints T1
653  x=-312 z=-43    y=240
657  x=0    z=-43    y=240 g=653,657,1
659  x=-312 z=-203.5 y=240
663  x=0    z=-203.5 y=240 g=659,663,1
665  x=-312 z=-384   y=240
667  x=0    z=-384   y=240
674  x=3840 z=-43    y=240
678  x=4152 z=-43    y=240 g=674,678,1
679  x=3840 z=-203.5 y=240
683  x=4152 z=-203.5 y=240 g=679,683,1
685  x=3840 z=-384   y=240
686  x=4152 z=-384   y=240

restraints
665  r=1,1,1,0,0,0
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
653 657 1 r=0,1,0,0,0,0
659 663 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
nm=56 nl=13 z=-1,0,0,0,0,0,0,0,0,0
1  sh=w18x76           w=.006333  E=29000
2  sh=218x6x1/2-3      w=.0038333
```

```
3  sh=216x6x3/8-3        w=.00248333
4  sh=213x3.5x5/16-3     w=.0011
5  sh=213x3x1/4-3        w=.00081667
6  sh=216x3.5x5/16-3     w=.0016333
7  sh=213x3x5/16-3       w=.00101667
8  sh=2L3.5X2.5X5/16-3   w=.001008333
9  sh=213x2.5x1/4-3      w=.00075
10 sh=213x2x5/16-3       w=.0008333
11 sh=216x6x1/2-3        w=.0030667
12 sh=218x6x1/2-3        w=.0038333
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
C       Live Load on braced frames
1 wg=0,0,-.1667      :100 psf---T1
C       Slab load on braced frames
```

```
2 wg=0,0,-.08333     :150pcfx4 in. ---T1
C       Roof Dead Loads
3 wg=0,0,-.005
C       Roof Live Loads
4 wg=0,0,-.033333
C       Wind Span Loads
5 wg=.09667,0,0
6 wg=.101667,0,0
7 wg=.006667,0,0
8 wg=-.02333,0,0
9 wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
C          Truss Elements T1-b
588  525  575  m=42 lp=2,0
C               Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=-2,0  lr=1,0,0,0,0,0
552  503  505  m=3  lp=-2,0
553  505  507  m=3  lp=-2,0
554  507  509  m=3  lp=-2,0
555  509  511  m=11 lp=-2,0
556  511  513  m=11 lp=-2,0
557  513  515  m=11 lp=-2,0
558  515  517  m=11 lp=-2,0
559  517  519  m=3  lp=-2,0
560  519  521  m=3  lp=-2,0
561  521  523  m=3  lp=-2,0
562  523  525  m=3  lp=-2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=-2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=-2,0
565  529  531  m=3  lp=-2,0
566  531  533  m=3  lp=-2,0
567  533  535  m=11 lp=-2,0
568  535  537  m=11 lp=-2,0
569  537  539  m=11 lp=-2,0
570  539  541  m=11 lp=-2,0
571  541  543  m=3  lp=-2,0
572  543  545  m=3  lp=-2,0
573  545  547  m=3  lp=-2,0
574  547  549  m=3  lp=-2,0      lr=0,1,0,0,0,0
C              Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0       lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0       lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0       lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0       lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0       lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0       lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0      lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0      lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0      lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0      lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0      lr=0,1,0,0,0,0
723  624  523  m=16 lp=-2,0      lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0       lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0       lr=0,1,0,0,0,0
```

```
730   630   531   m=13 lp=2,0       lr=0,1,0,0,0,0
732   632   533   m=8  lp=2,0       lr=0,1,0,0,0,0
734   634   535   m=10 lp=2,0       lr=0,1,0,0,0,0
736   636   537   m=13 lp=2,0       lr=0,1,0,0,0,0
737   638   537   m=13 lp=-2,0      lr=0,1,0,0,0,0
739   640   539   m=10 lp=-2,0      lr=0,1,0,0,0,0
741   642   541   m=9  lp=-2,0      lr=0,1,0,0,0,0
743   644   543   m=8  lp=-2,0      lr=0,1,0,0,0,0
745   646   545   m=7  lp=-2,0      lr=0,1,0,0,0,0
747   648   547   m=4  lp=-2,0      lr=0,1,0,0,0,0
C                Main Diagonal Top section
701   551   602   m=4  lp=2,0      lr=1,0,0,0,0,0
703   553   604   m=7  lp=2,0      lr=1,0,0,0,0,0
705   555   606   m=8  lp=2,0      lr=1,0,0,0,0,0
707   557   608   m=9  lp=2,0      lr=1,0,0,0,0,0
709   559   610   m=10 lp=2,0      lr=1,0,0,0,0,0
711   561   612   m=13 lp=2,0      lr=1,0,0,0,0,0
714   565   614   m=13 lp=-2,0     lr=1,0,0,0,0,0
716   567   616   m=10 lp=-2,0     lr=1,0,0,0,0,0
718   569   618   m=8  lp=-2,0     lr=1,0,0,0,0,0
720   571   620   m=13 lp=-2,0     lr=1,0,0,0,0,0
722   573   622   m=15 lp=-2,0     lr=1,0,0,0,0,0
724   575   624   m=16 lp=-2,0     lr=1,0,0,0,0,0
725   575   626   m=16 lp=2,0      lr=1,0,0,0,0,0
727   577   628   m=15 lp=2,0      lr=1,0,0,0,0,0
729   579   630   m=13 lp=2,0      lr=1,0,0,0,0,0
731   581   632   m=8  lp=2,0      lr=1,0,0,0,0,0
733   583   634   m=10 lp=2,0      lr=1,0,0,0,0,0
735   585   636   m=13 lp=2,0      lr=1,0,0,0,0,0
738   589   638   m=13 lp=-2,0     lr=1,0,0,0,0,0
740   591   640   m=10 lp=-2,0     lr=1,0,0,0,0,0
742   593   642   m=9  lp=-2,0     lr=1,0,0,0,0,0
744   595   644   m=8  lp=-2,0     lr=1,0,0,0,0,0
746   597   646   m=7  lp=-2,0     lr=1,0,0,0,0,0
748   599   648   m=4  lp=-2,0     lr=1,0,0,0,0,0
C                Diagonal Brace
626   553   602   m=5  lp=2,0       lr=1,1,0,0,0,0
627   555   604   m=5  lp=2,0       lr=1,1,0,0,0,0
628   557   606   m=5  lp=2,0       lr=1,1,0,0,0,0
629   559   608   m=5  lp=2,0       lr=1,1,0,0,0,0
630   561   610   m=5  lp=2,0       lr=1,1,0,0,0,0
631   563   612   m=5  lp=2,0       lr=1,1,0,0,0,0
632   563   614   m=5  lp=-2,0      lr=1,1,0,0,0,0
633   565   616   m=5  lp=-2,0      lr=1,1,0,0,0,0
634   567   618   m=5  lp=-2,0      lr=1,1,0,0,0,0
635   569   620   m=5  lp=-2,0      lr=1,1,0,0,0,0
636   571   622   m=5  lp=-2,0      lr=1,1,0,0,0,0
637   573   624   m=5  lp=-2,0      lr=1,1,0,0,0,0
638   577   626   m=5  lp=2,0       lr=1,1,0,0,0,0
639   579   628   m=5  lp=2,0       lr=1,1,0,0,0,0
640   581   630   m=5  lp=2,0       lr=1,1,0,0,0,0
641   583   632   m=5  lp=2,0       lr=1,1,0,0,0,0
642   585   634   m=5  lp=2,0       lr=1,1,0,0,0,0
643   587   636   m=5  lp=2,0       lr=1,1,0,0,0,0
644   587   638   m=5  lp=-2,0      lr=1,1,0,0,0,0
645   589   640   m=5  lp=-2,0      lr=1,1,0,0,0,0
646   591   642   m=5  lp=-2,0      lr=1,1,0,0,0,0
```

```
647   593   644   m=5   lp=-2,0        lr=1,1,0,0,0,0
648   595   646   m=5   lp=-2,0        lr=1,1,0,0,0,0
649   597   648   m=5   lp=-2,0        lr=1,1,0,0,0,0
C                     Vertical Brace
601   602   552   m=5   lp=2,0         lr=1,1,0,0,0,0
602   604   554   m=5   lp=2,0         lr=1,1,0,0,0,0
603   606   556   m=5   lp=2,0         lr=1,1,0,0,0,0
604   608   558   m=5   lp=2,0         lr=1,1,0,0,0,0
605   610   560   m=5   lp=2,0         lr=1,1,0,0,0,0
606   612   562   m=5   lp=2,0         lr=1,1,0,0,0,0
607   614   564   m=5   lp=2,0         lr=1,1,0,0,0,0
608   616   566   m=5   lp=2,0         lr=1,1,0,0,0,0
609   618   568   m=5   lp=2,0         lr=1,1,0,0,0,0
610   620   570   m=5   lp=2,0         lr=1,1,0,0,0,0
611   622   572   m=5   lp=2,0         lr=1,1,0,0,0,0
612   624   574   m=5   lp=2,0         lr=1,1,0,0,0,0
613   626   576   m=5   lp=-2,0        lr=1,1,0,0,0,0
614   628   578   m=5   lp=-2,0        lr=1,1,0,0,0,0
615   630   580   m=5   lp=-2,0        lr=1,1,0,0,0,0
616   632   582   m=5   lp=-2,0        lr=1,1,0,0,0,0
617   634   584   m=5   lp=-2,0        lr=1,1,0,0,0,0
618   636   586   m=5   lp=-2,0        lr=1,1,0,0,0,0
619   638   588   m=5   lp=-2,0        lr=1,1,0,0,0,0
620   640   590   m=5   lp=-2,0        lr=1,1,0,0,0,0
621   642   592   m=5   lp=-2,0        lr=1,1,0,0,0,0
622   644   594   m=5   lp=-2,0        lr=1,1,0,0,0,0
623   646   596   m=5   lp=-2,0        lr=1,1,0,0,0,0
624   648   598   m=5   lp=-2,0        lr=1,1,0,0,0,0
C                       Top Chord (3 axis ------)
501   551   552   m=2   lp=2,0         lr=1,0,0,0,0,0
502   552   553   m=2   lp=2,0
503   553   554   m=2   lp=2,0
504   554   555   m=2   lp=2,0
505   555   556   m=2   lp=2,0
506   556   557   m=2   lp=2,0
507   557   558   m=2   lp=2,0
508   558   559   m=2   lp=2,0
509   559   560   m=12  lp=2,0
510   560   561   m=12  lp=2,0
511   561   562   m=12  lp=2,0
512   562   563   m=12  lp=2,0
513   563   564   m=12  lp=2,0
514   564   565   m=12  lp=2,0
515   565   566   m=12  lp=2,0
516   566   567   m=12  lp=2,0
517   567   568   m=2   lp=2,0
518   568   569   m=2   lp=2,0
519   569   570   m=2   lp=2,0
520   570   571   m=2   lp=2,0
521   571   572   m=2   lp=2,0
522   572   573   m=2   lp=2,0
523   573   574   m=2   lp=2,0
524   574   575   m=2   lp=2,0       lr=0,1,0,0,0,0
525   575   576   m=2   lp=2,0       lr=1,0,0,0,0,0
526   576   577   m=2   lp=2,0
527   577   578   m=2   lp=2,0
528   578   579   m=2   lp=2,0
```

```
529  579  580  m=2   lp=2,0
530  580  581  m=2   lp=2,0
531  581  582  m=2   lp=2,0
532  582  583  m=2   lp=2,0
533  583  584  m=12  lp=2,0
534  584  585  m=12  lp=2,0
535  585  586  m=12  lp=2,0
536  586  587  m=12  lp=2,0
537  587  588  m=12  lp=2,0
538  588  589  m=12  lp=2,0
539  589  590  m=12  lp=2,0
540  590  591  m=12  lp=2,0
541  591  592  m=2   lp=2,0
542  592  593  m=2   lp=2,0
543  593  594  m=2   lp=2,0
544  594  595  m=2   lp=2,0
545  595  596  m=2   lp=2,0
546  596  597  m=2   lp=2,0
547  597  598  m=2   lp=2,0
548  598  599  m=2   lp=2,0       lr=0,1,0,0,0,0
C                South Vertical Member
576  501  551  m=1   lp=2,0     nsl=0,0,6,8,0,0,0,10,12,0 \
                                  lr=1,1,0,0,0,0
577  503  553  m=6   lp=2,0       lr=1,1,0,0,0,0
578  505  555  m=6   lp=2,0       lr=1,1,0,0,0,0
579  507  557  m=6   lp=2,0       lr=1,1,0,0,0,0
580  509  559  m=6   lp=2,0       lr=1,1,0,0,0,0
581  511  561  m=6   lp=2,0       lr=1,1,0,0,0,0
582  513  563  m=6   lp=2,0       lr=1,1,0,0,0,0
583  515  565  m=6   lp=2,0       lr=1,1,0,0,0,0
584  517  567  m=6   lp=2,0       lr=1,1,0,0,0,0
585  519  569  m=6   lp=2,0       lr=1,1,0,0,0,0
586  521  571  m=14  lp=2,0       lr=1,1,0,0,0,0
587  523  573  m=14  lp=2,0       lr=1,1,0,0,0,0
589  527  577  m=14  lp=-2,0      lr=1,1,0,0,0,0
590  529  579  m=14  lp=-2,0      lr=1,1,0,0,0,0
591  531  581  m=6   lp=-2,0      lr=1,1,0,0,0,0
592  533  583  m=6   lp=-2,0      lr=1,1,0,0,0,0
593  535  585  m=6   lp=-2,0      lr=1,1,0,0,0,0
594  537  587  m=6   lp=-2,0      lr=1,1,0,0,0,0
595  539  589  m=6   lp=-2,0      lr=1,1,0,0,0,0
596  541  591  m=6   lp=-2,0      lr=1,1,0,0,0,0
597  543  593  m=6   lp=-2,0      lr=1,1,0,0,0,0
598  545  595  m=6   lp=-2,0      lr=1,1,0,0,0,0
599  547  597  m=6   lp=-2,0      lr=1,1,0,0,0,0
600  549  599  m=1   lp=2,0      nsl=0,0,7,9,0,0,0,11,13,0 \
                                  lr=1,1,0,0,0,0
C        Bracing Frame Elements
805  653  654  m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
806  654  655  m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
807  655  656  m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
808  656  657  m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
809  659  660  m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
810  660  661  m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
811  661  662  m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
812  662  663  m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
817  665  659  m=20  lp=2,0      nsl=0,0,5,8,0,0,0,10,12,0
```

```
818   659   653   m=20  lp=2,0      nsl=0,0,5,8,0,0,0,10,12,0
820   667   663   m=1   lp=2,0
821   663   657   m=1   lp=2,0
822   657   501   m=1   lp=2,0      nsl=0,0,5,8,0,0,0,10,12,0
835   674   675   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
836   675   676   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
837   676   677   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
838   677   678   m=19  lp=2,0        nsl=3,0,0,0,0,4,0,0,0,0
859   679   680   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
860   680   681   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
861   681   682   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
862   682   683   m=18  lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0
867   686   683   m=20  lp=2,0      nsl=0,0,7,9,0,0,0,11,13,0
868   683   678   m=20  lp=2,0      nsl=0,0,7,9,0,0,0,11,13,0
871   685   679   m=1   lp=2,0
872   679   674   m=1   lp=2,0
873   674   549   m=1   lp=2,0      nsl=0,0,7,9,0,0,0,11,13,0

loads
C Dead Loads
551 599 48 l=1 f=0,0,-.752
552 554  1 l=1 f=0,0,-1.474
555        l=1 f=0,0,-1.664
556 558 1  l=1 f=0,0,-1.474
559        l=1 f=0,0,-1.664
560 562 1  l=1 f=0,0,-1.474
563        l=1 f=0,0,-1.904
564 566 1  l=1 f=0,0,-1.474
567        l=1 f=0,0,-1.664
568 570 1  l=1 f=0,0,-1.474
571        l=1 f=0,0,-1.664
572 574 1  l=1 f=0,0,-1.474
575        l=1 f=0,0,-2.920
576 578 1  l=1 f=0,0,-1.474
579        l=1 f=0,0,-1.664
580 582 1  l=1 f=0,0,-1.474
583        l=1 f=0,0,-1.664
584 586 1  l=1 f=0,0,-1.474
587        l=1 f=0,0,-1.904
588 590 1  l=1 f=0,0,-1.474
591        l=1 f=0,0,-1.664
592 594 1  l=1 f=0,0,-1.474
595        l=1 f=0,0,-1.664
596 598 1  l=1 f=0,0,-1.474
551 599 48 l=1 f=0,0,-.347
555 559 4  l=1 f=0,0,-.557
563 587 24 l=1 f=0,0,-.322
567 571 4  l=1 f=0,0,-.557
575        l=1 f=0,0,-.163
579 583 4  l=1 f=0,0,-.557
591 595 4  l=1 f=0,0,-.557
509 517 8  l=1 f=0,0,-.355
533 541 8  l=1 f=0,0,-.355
C Live Loads
501 549 48    l=2 f=0,0,-1.066
503 523 2     l=2 f=0,0,-2.133
527 547 2     l=2 f=0,0,-2.133
```

```
C Wind I
551         l=3 f=4,0,0
551         l=3 f=0,0,1.73
552 557 1   l=3 f=0,0,3.47
558         l=3 f=0,0,1.67
559 564 1   l=3 f=0,0,1.06
565 598 1   l=3 f=0,0,-.4
599         l=3 f=0,0,-.2
C Wind II
551          l=4 f=-.9,0,0
551          l=4 f=0,0,6.27
552 557 1    l=4 f=0,0,12.53
558          l=4 f=0,0,10.73
559 564 1    l=4 f=0,0,10.13
565 598 1    l=4 f=0,0,8.67
599          l=4 f=0,0,4.33
C Point Loads
503 523 2     l=5 f=0,0,-.5
527 547 2     l=5 f=0,0,-.5
C Roof Live Loads
551 599 48  l=6 f=0,0,-1.333
552 598 1   l=6 f=0,0,-2.6667
C Crane Dead Loads for Down Force
527 547 20  l=7 f=0,0,-2.6
529 545 4   l=7 f=0,0,-2.6
527 547 20  l=7 f=0,0,-.773
529 545 16  l=7 f=0,0,-1.6
533 541 8   l=7 f=0,0,-2.134
505 523 18  l=7 f=0,0,-.552
511 517 6   l=7 f=0,0,-.960
C Wind III
551         l=8 f=0,0,.338
552 557 1   l=8 f=0,0,.675
558         l=8 f=0,0,.675
559 564 1   l=8 f=0,0,.675
565 598 1   l=8 f=0,0,.675
599         l=8 f=0,0,.338
C Wind IV
551         l=9 f=0,0,4.86
552 557 1   l=9 f=0,0,9.72
558         l=9 f=0,0,9.72
559 564 1   l=9 f=0,0,9.72
565 598 1   l=9 f=0,0,9.72
599         l=9 f=0,0,4.86
C Crane Dead Loads for Uplift
505 523 6   l=10 f=0,0,-.333
527 545 6   l=10 f=0,0,-.33
```

Truss T1 Hangars 43 and 47 **Average Wind**

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,1,0,0,0
2 c=1,0,0,1,1,0,1,0,0,0
3 c=1,0,0,0,1,0,1,1,0,0
4 c=1,0,0,0,1,0,1,0,1,0

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375          :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8         :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0             :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625     :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625     :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625     :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625     :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625     :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38             :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38               :2L8x8x1/2

frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
729 730 1 m=64
735 738 1 m=64
```

```
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
805 812 1 l=1,.001
835 838 1 l=1,.001
859 862 1 l=1,.001
817 818 1 l=1,.001
820        l=1,.001
871        l=1,.001
867 868 1 l=1,.001
```

Truss T1 Hangars 43 and 47 **Retrofit: None**

Average Wind

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SAP90_FILE:t1-47/SAPSTL_FILE:asd.STL

Truss T1 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
501	T	(T)	.710	.267	.442	.000	80.02	2	(H2-1)	NON-COM
502	T	(T)	.709	.267	.442	.000	.00	2	(H2-1)	NON-COM
503	T	(T)	.909	.435	.474	.000	80.02	2	(H2-1)	NON-COM
504	T	(T)	.909	.435	.474	.000	.00	2	(H2-1)	NON-COM
505	T	(T)	.927	.542	.386	.000	80.02	2	(H2-1)	NON-COM
506	T	(T)	.927	.541	.386	.000	.00	2	(H2-1)	NON-COM
507	T	(T)	.872	.581	.291	.000	80.02	2	(H2-1)	NON-COM
508	T	(T)	.871	.580	.291	.000	.00	2	(H2-1)	NON-COM
509	T	(T)	.772	.558	.214	.000	80.02	4	(H2-1)	NON-COM
510	T	(T)	.772	.557	.214	.000	.00	4	(H2-1)	NON-COM
511	T	(T)	.680	.526	.154	.000	80.02	4	(H2-1)	NON-COM
512	T	(T)	.679	.526	.154	.000	.00	4	(H2-1)	NON-COM
513	T	(T)	.822	.525	.297	.000	80.02	2	(H2-1)	NON-COM
514	T	(T)	.821	.525	.297	.000	.00	2	(H2-1)	NON-COM
515	T	(T)	.852	.449	.403	.000	80.02	4	(H2-1)	NON-COM
516	T	(T)	.852	.449	.403	.000	.00	4	(H2-1)	NON-COM
517	T	(T)	.769	.338	.431	.000	80.02	4	(H2-1)	NON-COM
518	T	(T)	.769	.338	.431	.000	.00	4	(H2-1)	NON-COM
519	T	(T)	.624	.197	.427	.000	80.02	4	(H2-1)	NON-COM
520	T	(T)	.623	.196	.427	.000	.00	4	(H2-1)	NON-COM
523	T	(C)	.701	.239	.462	.000	.00	2	(H1-1)	NON-COM
524	T	(C)	.552	.240	.312	.000	.00	2	(H1-1)	NON-COM
525	T	(C)	.539	.298	.241	.000	80.02	2	(H1-1)	NON-COM
526	T	(C)	.689	.241	.448	.000	80.02	4	(H1-1)	NON-COM
529	T	(T)	.510	.121	.389	.000	80.02	4	(H2-1)	NON-COM

Truss T1 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
530	T									NON-COM
		(T)	.511	.122	.389	.000	.00	4	(H2-1)	
531	T									NON-COM
		(T)	.637	.248	.389	.000	80.02	4	(H2-1)	
532	T									NON-COM
		(T)	.637	.248	.389	.000	.00	4	(H2-1)	
533	T									NON-COM
		(C)	.524	.322	.201	.000	80.02	1	(H1-1)	
		(T)	.728	.353	.375	.000	80.02	4	(H2-1)	
534	T									NON-COM
		(C)	.524	.322	.201	.000	.00	1	(H1-1)	
		(T)	.728	.353	.375	.000	.00	4	(H2-1)	
535	T									NON-COM
		(C)	.511	.370	.140	.000	80.02	1	(H1-1)	
		(T)	.670	.422	.248	.000	80.02	4	(H2-1)	
536	T									NON-COM
		(C)	.511	.371	.140	.000	.00	1	(H1-1)	
		(T)	.670	.422	.248	.000	.00	4	(H2-1)	
537	T									NON-COM
		(T)	.556	.424	.131	.000	80.02	4	(H2-1)	
538	T									NON-COM
		(T)	.556	.424	.131	.000	.00	4	(H2-1)	
539	T									NON-COM
		(T)	.654	.458	.196	.000	80.02	4	(H2-1)	
540	T									NON-COM
		(T)	.655	.459	.196	.000	.00	4	(H2-1)	
541	T									NON-COM
		(C)	.555	.381	.174	.000	80.02	1	(H1-1)	
		(T)	.709	.449	.260	.000	80.02	4	(H2-1)	
542	T									NON-COM
		(C)	.555	.381	.174	.000	.00	1	(H1-1)	
		(T)	.709	.449	.260	.000	.00	4	(H2-1)	
543	T									NON-COM
		(C)	.527	.334	.193	.000	80.02	1	(H1-1)	
		(T)	.725	.412	.313	.000	80.02	4	(H2-1)	
544	T									NON-COM
		(C)	.527	.334	.193	.000	.00	1	(H1-1)	
		(T)	.725	.412	.313	.000	.00	4	(H2-1)	
545	T									NON-COM
		(T)	.682	.326	.355	.000	80.02	4	(H2-1)	
546	T									NON-COM
		(T)	.682	.326	.355	.000	.00	4	(H2-1)	
547	T									NON-COM
		(T)	.524	.209	.315	.000	80.02	4	(H2-1)	
548	T									NON-COM
		(T)	.524	.210	.315	.000	.00	4	(H2-1)	
553	G									NON-COM
		(C)	.943	.750	.193	.000	.00	2	(H1-1)	
554	G									NON-COM
		(C)	1.328	.985	.344	.000	160.00	2	(H1-1)	

Truss T1 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
555	T									NON-COM
		(C)	1.011	.820	.191	.000	.00	2	(H1-1)	
556	T									NON-COM
		(C)	1.013	.809	.204	.000	160.00	2	(H1-1)	
557	T									NON-COM
		(C)	.724	.573	.150	.000	160.00	2	(H1-1)	
561	G									NON-COM
		(C)	.574	.480	.095	.000	160.00	1	(H1-1)	
		(T)	.645	.582	.063	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.840	.713	.127	.000	.00	1	(H1-1)	
		(T)	1.009	.956	.053	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.855	.713	.142	.000	160.00	1	(H1-1)	
		(T)	1.007	.956	.051	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.684	.634	.050	.000	160.00	4	(H2-1)	
569	T									NON-COM
		(C)	.566	.456	.110	.000	.00	4	(H1-1)	
570	T									NON-COM
		(C)	.543	.442	.100	.000	.00	4	(H1-1)	
571	G									NON-COM
		(C)	.613	.499	.115	.000	.00	4	(H1-1)	
577	G									NON-COM
		(C)	.609	.609	.000	.000	.00	3	(H1-1)	
		(T)	.596	.596	.000	.000	.00	2	(H2-1)	
578	G			kl/r > 200						NON-COM
		(C)	.568	.568	.000	.000	.00	3	(H1-1)	
579	G			kl/r > 200						NON-COM
580	G			kl/r > 200						NON-COM
581	G			kl/r > 200						NON-COM
582	G			kl/r > 200						NON-COM
583	G			kl/r > 200						NON-COM
		(C)	.960	.960	.000	.000	.00	3	(H1-1)	
584	G			kl/r > 200						NON-COM
		(C)	1.457	1.457	.000	.000	.00	3	(H1-1)	
585	G			kl/r > 200						NON-COM
		(C)	1.339	1.339	.000	.000	.00	1	(H1-1)	
		(T)	.512	.512	.000	.000	.00	2	(H2-1)	
586	G			kl/r > 200						NON-COM
		(C)	1.302	1.302	.000	.000	.00	1	(H1-1)	
587	G			kl/r > 200						NON-COM
		(C)	1.337	1.337	.000	.000	.00	1	(H1-1)	
		(T)	.574	.574	.000	.000	.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.811	1.811	.000	.000	.00	1	(H1-1)	
		(T)	.514	.514	.000	.000	.00	4	(H2-1)	
590	G			kl/r > 200						NON-COM
		(C)	1.724	1.724	.000	.000	.00	1	(H1-1)	

Truss T1 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
591	G		kl/r > 200							NON-COM
		(C)	1.966	1.966	.000	.000	.00	1	(H1-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.967	1.967	.000	.000	.00	1	(H1-1)	
593	G		kl/r > 200							NON-COM
		(C)	1.293	1.293	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
597	G		kl/r > 200							NON-COM
		(C)	1.141	1.141	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.263	1.263	.000	.000	.00	1	(H1-1)	
599	G									NON-COM
		(C)	1.345	1.345	.000	.000	.00	1	(H1-1)	
601	T		kl/r > 200							NON-COM
603	T		kl/r > 200							NON-COM
604	T		kl/r > 200							NON-COM
605	T		kl/r > 200							NON-COM
606	T		kl/r > 200							NON-COM
607	T		kl/r > 200							NON-COM
608	T		kl/r > 200							NON-COM
609	T		kl/r > 200							NON-COM
611	T		kl/r > 200							NON-COM
612	T		kl/r > 200							NON-COM
618	T		kl/r > 200							NON-COM
619	T		kl/r > 200							NON-COM
620	T		kl/r > 200							NON-COM
621	T		kl/r > 200							NON-COM
701	T									NON-COM
		(C)	1.605	1.407	.198	.000	113.14	2	(H1-1)	
702	T									NON-COM
		(C)	1.547	1.361	.185	.000	.00	2	(H1-1)	
703	T									NON-COM
		(C)	1.342	1.234	.107	.000	114.32	2	(H1-1)	
704	T									NON-COM
		(C)	1.299	1.195	.104	.000	.00	2	(H1-1)	
705	T									NON-COM
		(C)	4.218	1.280	2.938	.000	115.52	2	(H1-1)	
706	T									NON-COM
		(C)	2.253	1.187	1.066	.000	.00	2	(H1-1)	
707	T									NON-COM
		(C)	1.079	.760	.319	.000	116.73	4	(H1-1)	
708	T									NON-COM
		(C)	.926	.683	.242	.000	.00	4	(H1-1)	
713	T									NON-COM
		(C)	.989	.751	.238	.000	.00	2	(H1-1)	
714	T									NON-COM
		(C)	1.071	.806	.264	.000	121.67	2	(H1-1)	
715	T		fa > Fe							NON-COM

Truss T1 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
716	T		fa > Fe							NON-COM
717	T		fa > Fe							NON-COM
718	T		fa > Fe							NON-COM
719	T		fa > Fe							NON-COM
720	T		fa > Fe							NON-COM
721	T									NON-COM
		(C)	2.591	1.845	.746	.000	.00	4	(H1-1)	
722	T									NON-COM
		(C)	2.585	1.843	.742	.000	126.77	4	(H1-1)	
723	T									NON-COM
		(C)	4.040	1.639	2.401	.000	.00	4	(H1-1)	
724	T									NON-COM
		(C)	4.797	1.665	3.132	.000	128.06	4	(H1-1)	
725	T									NON-COM
		(C)	2.202	1.442	.760	.000	128.06	4	(H1-1)	
		(T)	.717	.656	.061	.000	96.05	1	(H2-1)	
726	T									NON-COM
		(C)	2.100	1.410	.690	.000	.00	4	(H1-1)	
		(T)	.718	.657	.061	.000	32.02	1	(H2-1)	
727	T									NON-COM
		(C)	2.038	1.618	.420	.000	126.77	4	(H1-1)	
		(T)	.626	.574	.052	.000	126.77	1	(H2-1)	
728	T									NON-COM
		(C)	2.026	1.611	.415	.000	.00	4	(H1-1)	
		(T)	.638	.586	.052	.000	.00	1	(H2-1)	
729	T		fa > Fe							NON-COM
730	T		fa > Fe							NON-COM
731	T		fa > Fe							NON-COM
732	T		fa > Fe							NON-COM
733	T		fa > Fe							NON-COM
734	T		fa > Fe							NON-COM
735	T									NON-COM
		(C)	.777	.613	.164	.000	121.67	4	(H1-1)	
736	T									NON-COM
		(C)	.707	.556	.152	.000	.00	4	(H1-1)	
741	T									NON-COM
		(C)	.618	.485	.133	.000	.00	4	(H1-1)	
742	T									NON-COM
		(C)	.734	.573	.161	.000	116.73	4	(H1-1)	
743	T									NON-COM
		(C)	1.315	.963	.351	.000	.00	4	(H1-1)	
744	T									NON-COM
		(C)	1.434	1.019	.414	.000	115.52	4	(H1-1)	
745	T									NON-COM
		(C)	.899	.835	.064	.000	.00	4	(H1-1)	
746	T									NON-COM
		(C)	.926	.860	.065	.000	114.32	4	(H1-1)	
747	T									NON-COM
		(C)	.980	.896	.084	.000	.00	4	(H1-1)	
		(T)	.543	.524	.019	.000	56.57	1	(H2-1)	

Truss T1 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
748	T									NON-COM
		(C)	1.015	.929	.086	.000	113.14	4	(H1-1)	
		(T)	.542	.522	.019	.000	56.57	1	(H2-1)	
805	W18X46									COMPACT
		(T)	.615	.045	.570	.000	.00	2	(H2-1)	
808	W18X46									COMPACT
		(T)	.793	.045	.748	.000	78.00	2	(H2-1)	
809	W24X68									COMPACT
		(C)	.666	.026	.640	.000	.00	1	(H1-3)	
812	W24X68									COMPACT
		(C)	1.014	.026	.987	.000	78.00	1	(H1-3)	
817	W18X65									COMPACT
		(T)	.743	.017	.726	.000	180.50	1	(H2-1)	
820	W18X76									COMPACT
		(C)	1.031	.098	.933	.000	180.50	1	(H1-3)	
		(T)	.632	.086	.546	.000	180.50	2	(H2-1)	
821	W18X76									COMPACT
		(T)	.581	.123	.457	.000	.00	4	(H2-1)	
835	W18X46									COMPACT
		(C)	.727	.056	.671	.000	.00	1	(H1-3)	
		(T)	.585	.061	.524	.000	.00	4	(H2-1)	
838	W18X46									COMPACT
		(C)	.728	.056	.673	.000	78.00	1	(H1-3)	
859	W24X68									COMPACT
		(T)	.672	.013	.658	.000	.00	1	(H2-1)	
862	W24X68									COMPACT
		(T)	.965	.013	.952	.000	78.00	1	(H2-1)	
867	W18X65									COMPACT
		(C)	.883	.086	.797	.000	180.50	2	(H1-3)	
868	W18X65									COMPACT
		(C)	.520	.025	.495	.000	.00	1	(H1-3)	
871	W18X76									COMPACT
		(C)	.643	.078	.565	.000	180.50	1	(H1-3)	
		(T)	.790	.086	.704	.000	180.50	2	(H2-1)	
872	W18X76									COMPACT
		(T)	.556	.098	.458	.000	.00	4	(H2-1)	

Truss T1 Hangars 43 and 47 Maximum Wind

C **SAP90 INPUT**

```
system
L=10
C
C
C
joints
C     Truss Joints T1
501  x=0     z=0          y=240
549  x=3840  z=0          y=240  g=501,549,2
551  x=0     z=160        y=240
575  x=1920  z=200        y=240  g=551,575,1
599  x=3840  z=160        y=240  g=575,599,1
602  x=80    z=80
612  x=880   z=88.333            g=602,612,2
614  x=1040  z=91.6667    y=240
624  x=1840  z=100        y=240  g=614,624,2
626  x=2000  z=100        y=240
636  x=2800  z=91.6667    y=240  g=626,636,2
638  x=2960  z=88.3333    y=240
648  x=3760  z=80         y=240  g=638,648,2
C     Bracing Frame Joints T1
653  x=-312  z=-43     y=240
657  x=0     z=-43     y=240 g=653,657,1
659  x=-312  z=-203.5  y=240
663  x=0     z=-203.5  y=240 g=659,663,1
665  x=-312  z=-384    y=240
667  x=0     z=-384    y=240
674  x=3840  z=-43     y=240
678  x=4152  z=-43     y=240 g=674,678,1
679  x=3840  z=-203.5  y=240
683  x=4152  z=-203.5  y=240 g=679,683,1
685  x=3840  z=-384    y=240
686  x=4152  z=-384    y=240

restraints
665  r=1,1,1,0,0,0
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
653 657 1 r=0,1,0,0,0,0
659 663 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
nm=56 nl=13 z=-1,0,0,0,0,0,0,0,0,0
1  sh=w18x76           w=.006333   E=29000
2  sh=218x6x1/2-3      w=.0038333
```

```
3  sh=216x6x3/8-3       w=.00248333
4  sh=213x3.5x5/16-3    w=.0011
5  sh=213x3x1/4-3       w=.00081667
6  sh=216x3.5x5/16-3    w=.0016333
7  sh=213x3x5/16-3      w=.00101667
8  sh=2L3.5X2.5X5/16-3  w=.001008333
9  sh=213x2.5x1/4-3     w=.00075
10 sh=213x2x5/16-3      w=.0008333
11 sh=216x6x1/2-3       w=.0030667
12 sh=218x6x1/2-3       w=.0038333
13 sh=214x3x5/16-3      w=.0012
14 sh=216x4x3/8-3       w=.00205
15 sh=215x3x1/4-3       w=.0011
16 sh=215x3.5x5/16-3    w=.00145
17 sh=w18x65            w=.00541667
18 sh=w24x68            w=.005667
19 sh=w18x46            w=.0038333
20 sh=w18x65            w=.00541667
21 sh=216x6x5/8-3       w=.0040333
22 sh=213x2.5x1/4-3     w=.00075
23 sh=w8x18             w=.0015
24 sh=w12x22            w=.0018333
25 sh=w10x22            w=.0018333
26 sh=w14x30            w=.0025
27 sh=w8x31             w=.00258333
28 sh=w12x26            w=.0021667
29 sh=w10x12            w=.001
30 sh=w10x22            w=.0018333
31 sh=14x3x1/4          w=.00048333
32 sh=13.5x2.5x1/4      w=.000408333
33 sh=215x3.5x3/8-3     w=.0017333
34 sh=w14x90            w=.0075
35 sh=w14x145           w=.01208333
36 sh=w33x201           w=.01675
37 sh=217x4x1/2         w=.00298
38 sh=w14x74            w=.0061667
39 sh=w14x43            w=.00358333
40 sh=215x3x5/16        w=.0013667
41 sh=s12x50            w=.0041667
42 sh=w14x61            w=.00508333
43 sh=w6x16             w=.001333
44 sh=213x2.5x1/4-3     w=.00075
45 sh=mc12x31           w=.00258333
46 sh=mc12x31           w=.00258333
47 sh=mc12x31           w=.00258333
48 sh=216x3.5x3/8-3     w=.00195
49 sh=215x3x5/16-3      w=.0013667
50 sh=215x5x3/8         w=.00205
51 sh=13x2.5x1/4        w=.000375
52 sh=13x2x1/4          w=.000341667
53 sh=w14x30            w=.0025
54 sh=215x3.5x5/16-3    w=.00145
55 sh=w14x34            w=.0028333
56 sh=14x3x5/16         w=.0006
C      Live Load on braced frames
1 wg=0,0,-.1667     :100 psf---T1
C      Slab load on braced frames
```

```
2 wg=0,0,-.08333     :150pcfx4 in. ---T1
C        Roof Dead Loads
3 wg=0,0,-.005
C        Roof Live Loads
4 wg=0,0,-.033333
C        Wind Span Loads
5 wg=.09667,0,0
6 wg=.101667,0,0
7 wg=.006667,0,0
8 wg=-.02333,0,0
9 wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
C          Truss Elements T1-b
588  525  575  m=42 lp=2,0
C               Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=-2,0  lr=1,0,0,0,0,0
552  503  505  m=3  lp=-2,0
553  505  507  m=3  lp=-2,0
554  507  509  m=3  lp=-2,0
555  509  511  m=11 lp=-2,0
556  511  513  m=11 lp=-2,0
557  513  515  m=11 lp=-2,0
558  515  517  m=11 lp=-2,0
559  517  519  m=3  lp=-2,0
560  519  521  m=3  lp=-2,0
561  521  523  m=3  lp=-2,0
562  523  525  m=3  lp=-2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=-2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=-2,0
565  529  531  m=3  lp=-2,0
566  531  533  m=3  lp=-2,0
567  533  535  m=11 lp=-2,0
568  535  537  m=11 lp=-2,0
569  537  539  m=11 lp=-2,0
570  539  541  m=11 lp=-2,0
571  541  543  m=3  lp=-2,0
572  543  545  m=3  lp=-2,0
573  545  547  m=3  lp=-2,0
574  547  549  m=3  lp=-2,0     lr=0,1,0,0,0,0
C              Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0      lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0      lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0      lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0      lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0      lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0      lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0     lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0     lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0     lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0     lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0     lr=0,1,0,0,0,0
723  624  523  m=16 lp=-2,0     lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0      lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0      lr=0,1,0,0,0,0
```

```
730   630   531   m=13  lp=2,0        lr=0,1,0,0,0,0
732   632   533   m=8   lp=2,0        lr=0,1,0,0,0,0
734   634   535   m=10  lp=2,0        lr=0,1,0,0,0,0
736   636   537   m=13  lp=2,0        lr=0,1,0,0,0,0
737   638   537   m=13  lp=-2,0       lr=0,1,0,0,0,0
739   640   539   m=10  lp=-2,0       lr=0,1,0,0,0,0
741   642   541   m=9   lp=-2,0       lr=0,1,0,0,0,0
743   644   543   m=8   lp=-2,0       lr=0,1,0,0,0,0
745   646   545   m=7   lp=-2,0       lr=0,1,0,0,0,0
747   648   547   m=4   lp=-2,0       lr=0,1,0,0,0,0
C                   Main Diagonal Top section
701   551   602   m=4   lp=2,0      lr=1,0,0,0,0,0
703   553   604   m=7   lp=2,0      lr=1,0,0,0,0,0
705   555   606   m=8   lp=2,0      lr=1,0,0,0,0,0
707   557   608   m=9   lp=2,0      lr=1,0,0,0,0,0
709   559   610   m=10  lp=2,0      lr=1,0,0,0,0,0
711   561   612   m=13  lp=2,0      lr=1,0,0,0,0,0
714   565   614   m=13  lp=-2,0     lr=1,0,0,0,0,0
716   567   616   m=10  lp=-2,0     lr=1,0,0,0,0,0
718   569   618   m=8   lp=-2,0     lr=1,0,0,0,0,0
720   571   620   m=13  lp=-2,0     lr=1,0,0,0,0,0
722   573   622   m=15  lp=-2,0     lr=1,0,0,0,0,0
724   575   624   m=16  lp=-2,0     lr=1,0,0,0,0,0
725   575   626   m=16  lp=2,0      lr=1,0,0,0,0,0
727   577   628   m=15  lp=2,0      lr=1,0,0,0,0,0
729   579   630   m=13  lp=2,0      lr=1,0,0,0,0,0
731   581   632   m=8   lp=2,0      lr=1,0,0,0,0,0
733   583   634   m=10  lp=2,0      lr=1,0,0,0,0,0
735   585   636   m=13  lp=2,0      lr=1,0,0,0,0,0
738   589   638   m=13  lp=-2,0     lr=1,0,0,0,0,0
740   591   640   m=10  lp=-2,0     lr=1,0,0,0,0,0
742   593   642   m=9   lp=-2,0     lr=1,0,0,0,0,0
744   595   644   m=8   lp=-2,0     lr=1,0,0,0,0,0
746   597   646   m=7   lp=-2,0     lr=1,0,0,0,0,0
748   599   648   m=4   lp=-2,0     lr=1,0,0,0,0,0
C                   Diagonal Brace
626   553   602   m=5   lp=2,0        lr=1,1,0,0,0,0
627   555   604   m=5   lp=2,0        lr=1,1,0,0,0,0
628   557   606   m=5   lp=2,0        lr=1,1,0,0,0,0
629   559   608   m=5   lp=2,0        lr=1,1,0,0,0,0
630   561   610   m=5   lp=2,0        lr=1,1,0,0,0,0
631   563   612   m=5   lp=2,0        lr=1,1,0,0,0,0
632   563   614   m=5   lp=-2,0       lr=1,1,0,0,0,0
633   565   616   m=5   lp=-2,0       lr=1,1,0,0,0,0
634   567   618   m=5   lp=-2,0       lr=1,1,0,0,0,0
635   569   620   m=5   lp=-2,0       lr=1,1,0,0,0,0
636   571   622   m=5   lp=-2,0       lr=1,1,0,0,0,0
637   573   624   m=5   lp=-2,0       lr=1,1,0,0,0,0
638   577   626   m=5   lp=2,0        lr=1,1,0,0,0,0
639   579   628   m=5   lp=2,0        lr=1,1,0,0,0,0
640   581   630   m=5   lp=2,0        lr=1,1,0,0,0,0
641   583   632   m=5   lp=2,0        lr=1,1,0,0,0,0
642   585   634   m=5   lp=2,0        lr=1,1,0,0,0,0
643   587   636   m=5   lp=2,0        lr=1,1,0,0,0,0
644   587   638   m=5   lp=-2,0       lr=1,1,0,0,0,0
645   589   640   m=5   lp=-2,0       lr=1,1,0,0,0,0
646   591   642   m=5   lp=-2,0       lr=1,1,0,0,0,0
```

```
647  593  644  m=5  lp=-2,0      lr=1,1,0,0,0,0
648  595  646  m=5  lp=-2,0      lr=1,1,0,0,0,0
649  597  648  m=5  lp=-2,0      lr=1,1,0,0,0,0
C                  Vertical Brace
601  602  552  m=5  lp=2,0       lr=1,1,0,0,0,0
602  604  554  m=5  lp=2,0       lr=1,1,0,0,0,0
603  606  556  m=5  lp=2,0       lr=1,1,0,0,0,0
604  608  558  m=5  lp=2,0       lr=1,1,0,0,0,0
605  610  560  m=5  lp=2,0       lr=1,1,0,0,0,0
606  612  562  m=5  lp=2,0       lr=1,1,0,0,0,0
607  614  564  m=5  lp=2,0       lr=1,1,0,0,0,0
608  616  566  m=5  lp=2,0       lr=1,1,0,0,0,0
609  618  568  m=5  lp=2,0       lr=1,1,0,0,0,0
610  620  570  m=5  lp=2,0       lr=1,1,0,0,0,0
611  622  572  m=5  lp=2,0       lr=1,1,0,0,0,0
612  624  574  m=5  lp=2,0       lr=1,1,0,0,0,0
613  626  576  m=5  lp=-2,0      lr=1,1,0,0,0,0
614  628  578  m=5  lp=-2,0      lr=1,1,0,0,0,0
615  630  580  m=5  lp=-2,0      lr=1,1,0,0,0,0
616  632  582  m=5  lp=-2,0      lr=1,1,0,0,0,0
617  634  584  m=5  lp=-2,0      lr=1,1,0,0,0,0
618  636  586  m=5  lp=-2,0      lr=1,1,0,0,0,0
619  638  588  m=5  lp=-2,0      lr=1,1,0,0,0,0
620  640  590  m=5  lp=-2,0      lr=1,1,0,0,0,0
621  642  592  m=5  lp=-2,0      lr=1,1,0,0,0,0
622  644  594  m=5  lp=-2,0      lr=1,1,0,0,0,0
623  646  596  m=5  lp=-2,0      lr=1,1,0,0,0,0
624  648  598  m=5  lp=-2,0      lr=1,1,0,0,0,0
C                  Top Chord (3 axis ------)
501  551  552  m=2  lp=2,0       lr=1,0,0,0,0,0
502  552  553  m=2  lp=2,0
503  553  554  m=2  lp=2,0
504  554  555  m=2  lp=2,0
505  555  556  m=2  lp=2,0
506  556  557  m=2  lp=2,0
507  557  558  m=2  lp=2,0
508  558  559  m=2  lp=2,0
509  559  560  m=12 lp=2,0
510  560  561  m=12 lp=2,0
511  561  562  m=12 lp=2,0
512  562  563  m=12 lp=2,0
513  563  564  m=12 lp=2,0
514  564  565  m=12 lp=2,0
515  565  566  m=12 lp=2,0
516  566  567  m=12 lp=2,0
517  567  568  m=2  lp=2,0
518  568  569  m=2  lp=2,0
519  569  570  m=2  lp=2,0
520  570  571  m=2  lp=2,0
521  571  572  m=2  lp=2,0
522  572  573  m=2  lp=2,0
523  573  574  m=2  lp=2,0
524  574  575  m=2  lp=2,0     lr=0,1,0,0,0,0
525  575  576  m=2  lp=2,0     lr=1,0,0,0,0,0
526  576  577  m=2  lp=2,0
527  577  578  m=2  lp=2,0
528  578  579  m=2  lp=2,0
```

```
529  579  580  m=2  lp=2,0
530  580  581  m=2  lp=2,0
531  581  582  m=2  lp=2,0
532  582  583  m=2  lp=2,0
533  583  584  m=12 lp=2,0
534  584  585  m=12 lp=2,0
535  585  586  m=12 lp=2,0
536  586  587  m=12 lp=2,0
537  587  588  m=12 lp=2,0
538  588  589  m=12 lp=2,0
539  589  590  m=12 lp=2,0
540  590  591  m=12 lp=2,0
541  591  592  m=2  lp=2,0
542  592  593  m=2  lp=2,0
543  593  594  m=2  lp=2,0
544  594  595  m=2  lp=2,0
545  595  596  m=2  lp=2,0
546  596  597  m=2  lp=2,0
547  597  598  m=2  lp=2,0
548  598  599  m=2  lp=2,0     lr=0,1,0,0,0,0
C              South Vertical Member
576  501  551  m=1  lp=2,0    nsl=0,0,6,8,0,0,0,10,12,0 \
                               lr=1,1,0,0,0,0
577  503  553  m=6  lp=2,0     lr=1,1,0,0,0,0
578  505  555  m=6  lp=2,0     lr=1,1,0,0,0,0
579  507  557  m=6  lp=2,0     lr=1,1,0,0,0,0
580  509  559  m=6  lp=2,0     lr=1,1,0,0,0,0
581  511  561  m=6  lp=2,0     lr=1,1,0,0,0,0
582  513  563  m=6  lp=2,0     lr=1,1,0,0,0,0
583  515  565  m=6  lp=2,0     lr=1,1,0,0,0,0
584  517  567  m=6  lp=2,0     lr=1,1,0,0,0,0
585  519  569  m=6  lp=2,0     lr=1,1,0,0,0,0
586  521  571  m=14 lp=2,0     lr=1,1,0,0,0,0
587  523  573  m=14 lp=2,0     lr=1,1,0,0,0,0
589  527  577  m=14 lp=-2,0    lr=1,1,0,0,0,0
590  529  579  m=14 lp=-2,0    lr=1,1,0,0,0,0
591  531  581  m=6  lp=-2,0    lr=1,1,0,0,0,0
592  533  583  m=6  lp=-2,0    lr=1,1,0,0,0,0
593  535  585  m=6  lp=-2,0    lr=1,1,0,0,0,0
594  537  587  m=6  lp=-2,0    lr=1,1,0,0,0,0
595  539  589  m=6  lp=-2,0    lr=1,1,0,0,0,0
596  541  591  m=6  lp=-2,0    lr=1,1,0,0,0,0
597  543  593  m=6  lp=-2,0    lr=1,1,0,0,0,0
598  545  595  m=6  lp=-2,0    lr=1,1,0,0,0,0
599  547  597  m=6  lp=-2,0    lr=1,1,0,0,0,0
600  549  599  m=1  lp=2,0     nsl=0,0,7,9,0,0,0,11,13,0 \
                               lr=1,1,0,0,0,0
C       Bracing Frame Elements
805  653  654  m=19 lp=2,0      nsl=3,0,0,0,0,4,0,0,0,0
806  654  655  m=19 lp=2,0      nsl=3,0,0,0,0,4,0,0,0,0
807  655  656  m=19 lp=2,0      nsl=3,0,0,0,0,4,0,0,0,0
808  656  657  m=19 lp=2,0      nsl=3,0,0,0,0,4,0,0,0,0
809  659  660  m=18 lp=2,0      nsl=2,1,0,0,0,0,0,0,0,0
810  660  661  m=18 lp=2,0      nsl=2,1,0,0,0,0,0,0,0,0
811  661  662  m=18 lp=2,0      nsl=2,1,0,0,0,0,0,0,0,0
812  662  663  m=18 lp=2,0      nsl=2,1,0,0,0,0,0,0,0,0
817  665  659  m=20 lp=2,0    nsl=0,0,5,8,0,0,0,10,12,0
```

```
818   659   653   m=20 lp=2,0        nsl=0,0,5,8,0,0,0,10,12,0
820   667   663   m=1  lp=2,0
821   663   657   m=1  lp=2,0
822   657   501   m=1  lp=2,0        nsl=0,0,5,8,0,0,0,10,12,0
835   674   675   m=19 lp=2,0          nsl=3,0,0,0,0,4,0,0,0,0
836   675   676   m=19 lp=2,0          nsl=3,0,0,0,0,4,0,0,0,0
837   676   677   m=19 lp=2,0          nsl=3,0,0,0,0,4,0,0,0,0
838   677   678   m=19 lp=2,0          nsl=3,0,0,0,0,4,0,0,0,0
859   679   680   m=18 lp=2,0          nsl=2,1,0,0,0,0,0,0,0,0
860   680   681   m=18 lp=2,0          nsl=2,1,0,0,0,0,0,0,0,0
861   681   682   m=18 lp=2,0          nsl=2,1,0,0,0,0,0,0,0,0
862   682   683   m=18 lp=2,0          nsl=2,1,0,0,0,0,0,0,0,0
867   686   683   m=20 lp=2,0        nsl=0,0,7,9,0,0,0,11,13,0
868   683   678   m=20 lp=2,0        nsl=0,0,7,9,0,0,0,11,13,0
871   685   679   m=1  lp=2,0
872   679   674   m=1  lp=2,0
873   674   549   m=1  lp=2,0        nsl=0,0,7,9,0,0,0,11,13,0

loads
C Dead Loads
551 599 48 l=1 f=0,0,-.752
552 554  1 l=1 f=0,0,-1.474
555        l=1 f=0,0,-1.664
556 558 1  l=1 f=0,0,-1.474
559        l=1 f=0,0,-1.664
560 562 1  l=1 f=0,0,-1.474
563        l=1 f=0,0,-1.904
564 566 1  l=1 f=0,0,-1.474
567        l=1 f=0,0,-1.664
568 570 1  l=1 f=0,0,-1.474
571        l=1 f=0,0,-1.664
572 574 1  l=1 f=0,0,-1.474
575        l=1 f=0,0,-2.920
576 578 1  l=1 f=0,0,-1.474
579        l=1 f=0,0,-1.664
580 582 1  l=1 f=0,0,-1.474
583        l=1 f=0,0,-1.664
584 586 1  l=1 f=0,0,-1.474
587        l=1 f=0,0,-1.904
588 590 1  l=1 f=0,0,-1.474
591        l=1 f=0,0,-1.664
592 594 1  l=1 f=0,0,-1.474
595        l=1 f=0,0,-1.664
596 598 1  l=1 f=0,0,-1.474
551 599 48 l=1 f=0,0,-.347
555 559 4  l=1 f=0,0,-.557
563 587 24 l=1 f=0,0,-.322
567 571 4  l=1 f=0,0,-.557
575        l=1 f=0,0,-.163
579 583 4  l=1 f=0,0,-.557
591 595 4  l=1 f=0,0,-.557
509 517 8  l=1 f=0,0,-.355
533 541 8  l=1 f=0,0,-.355
C Live Loads
501 549 48    l=2 f=0,0,-1.066
503 523 2     l=2 f=0,0,-2.133
527 547 2     l=2 f=0,0,-2.133
```

```
C Wind I
551          l=3 f=4,0,0
551          l=3 f=0,0,1.73
552 557 1    l=3 f=0,0,3.47
558          l=3 f=0,0,1.67
559 564 1    l=3 f=0,0,1.06
565 598 1    l=3 f=0,0,-.4
599          l=3 f=0,0,-.2
C Wind II
551           l=4 f=-.9,0,0
551           l=4 f=0,0,6.27
552 557 1     l=4 f=0,0,12.53
558           l=4 f=0,0,10.73
559 564 1     l=4 f=0,0,10.13
565 598 1     l=4 f=0,0,8.67
599           l=4 f=0,0,4.33
C Point Loads
503 523 2      l=5 f=0,0,-.5
527 547 2      l=5 f=0,0,-.5
C Roof Live Loads
551 599 48  l=6 f=0,0,-1.333
552 598 1   l=6 f=0,0,-2.6667
C Crane Dead Loads for Down Force
527 547 20  l=7 f=0,0,-2.6
529 545 4   l=7 f=0,0,-2.6
527 547 20  l=7 f=0,0,-.773
529 545 16  l=7 f=0,0,-1.6
533 541 8   l=7 f=0,0,-2.134
505 523 18  l=7 f=0,0,-.552
511 517 6   l=7 f=0,0,-.960
C Wind III
551         l=8 f=0,0,1.93
552 557 1   l=8 f=0,0,3.87
558         l=8 f=0,0,3.87
559 564 1   l=8 f=0,0,3.87
565 598 1   l=8 f=0,0,3.87
599         l=8 f=0,0,1.93
C Wind IV
551         l=9 f=0,0,6.4
552 557 1   l=9 f=0,0,12.8
558         l=9 f=0,0,12.8
559 564 1   l=9 f=0,0,12.8
565 598 1   l=9 f=0,0,12.8
599         l=9 f=0,0,6.4
C Crane Dead Loads for Uplift
505 523 6   l=10 f=0,0,-.333
527 545 6   l=10 f=0,0,-.33
```

Truss T1 Hangars 43 and 47 **Maximum Wind**

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,1,0,0,0
2 c=1,0,0,1,1,0,0,0,0,1
3 c=1,0,0,0,1,0,0,1,0,1
4 c=1,0,0,0,1,0,0,0,1,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375          :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8         :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0             :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625     :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625     :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625     :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625     :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625     :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38             :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38               :2L8x8x1/2

frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
729 730 1 m=64
735 738 1 m=64
```

```
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
805 812 1 l=1,.001
835 838 1 l=1,.001
859 862 1 l=1,.001
817 818 1 l=1,.001
820       l=1,.001
871       l=1,.001
867 868 1 l=1,.001
```

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 22
SAP90_FILE:t1-47/SAPSTL_FILE:asd.STL

Truss T1 Hangars 43 and 47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
501	T	(T)	.847	.336	.511	.000	80.02	4	(H2-1)	NON-COM
502	T	(T)	.847	.336	.511	.000	.00	4	(H2-1)	NON-COM
503	T	(T)	1.104	.540	.564	.000	80.02	4	(H2-1)	NON-COM
504	T	(T)	1.103	.539	.564	.000	.00	4	(H2-1)	NON-COM
505	T	(T)	1.160	.679	.481	.000	80.02	4	(H2-1)	NON-COM
506	T	(T)	1.159	.678	.481	.000	.00	4	(H2-1)	NON-COM
507	T	(T)	1.150	.747	.403	.000	80.02	4	(H2-1)	NON-COM
508	T	(T)	1.150	.747	.403	.000	.00	4	(H2-1)	NON-COM
509	T	(T)	1.028	.754	.274	.000	80.02	4	(H2-1)	NON-COM
510	T	(T)	1.028	.754	.274	.000	.00	4	(H2-1)	NON-COM
511	T	(T)	.889	.698	.190	.000	80.02	4	(H2-1)	NON-COM
512	T	(T)	.888	.698	.190	.000	.00	4	(H2-1)	NON-COM
513	T	(T)	1.082	.694	.387	.000	80.02	4	(H2-1)	NON-COM
514	T	(T)	1.081	.694	.387	.000	.00	4	(H2-1)	NON-COM
515	T	(T)	1.154	.577	.577	.000	80.02	4	(H2-1)	NON-COM
516	T	(T)	1.154	.576	.577	.000	.00	4	(H2-1)	NON-COM
517	T	(T)	1.028	.408	.621	.000	80.02	4	(H2-1)	NON-COM
518	T	(T)	1.027	.407	.621	.000	.00	4	(H2-1)	NON-COM
519	T	(T)	.801	.190	.611	.000	80.02	4	(H2-1)	NON-COM
520	T	(T)	.800	.189	.611	.000	.00	4	(H2-1)	NON-COM
521	T	(C)	.755	.088	.667	.000	80.02	4	(H1-3)	NON-COM
522	T	(C)	.790	.089	.701	.000	80.02	4	(H1-3)	NON-COM
523	T	(C)	1.167	.426	.741	.000	.00	4	(H1-1)	NON-COM
524	T	(C)	.918	.427	.492	.000	.00	4	(H1-1)	NON-COM
525	T	(C)	.918	.426	.492	.000	80.02	4	(H1-1)	NON-COM

Truss T1 Hangars 43 and 47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
526	T									NON-COM
		(C)	1.167	.426	.741	.000	80.02	4	(H1-1)	
527	T									NON-COM
		(C)	.790	.089	.701	.000	.00	4	(H1-3)	
528	T									NON-COM
		(C)	.755	.088	.667	.000	.00	4	(H1-3)	
529	T									NON-COM
		(T)	.800	.189	.611	.000	80.02	4	(H2-1)	
530	T									NON-COM
		(T)	.801	.190	.611	.000	.00	4	(H2-1)	
531	T									NON-COM
		(T)	1.028	.407	.621	.000	80.02	4	(H2-1)	
532	T									NON-COM
		(T)	1.028	.408	.621	.000	.00	4	(H2-1)	
533	T									NON-COM
		(C)	.524	.322	.201	.000	80.02	1	(H1-1)	
		(T)	1.154	.577	.577	.000	80.02	4	(H2-1)	
534	T									NON-COM
		(C)	.524	.322	.201	.000	.00	1	(H1-1)	
		(T)	1.154	.577	.577	.000	.00	4	(H2-1)	
535	T									NON-COM
		(C)	.511	.370	.140	.000	80.02	1	(H1-1)	
		(T)	1.081	.694	.387	.000	80.02	4	(H2-1)	
536	T									NON-COM
		(C)	.511	.371	.140	.000	.00	1	(H1-1)	
		(T)	1.082	.694	.387	.000	.00	4	(H2-1)	
537	T									NON-COM
		(T)	.888	.698	.190	.000	80.02	4	(H2-1)	
538	T									NON-COM
		(T)	.889	.698	.190	.000	.00	4	(H2-1)	
539	T									NON-COM
		(T)	1.028	.754	.274	.000	80.02	4	(H2-1)	
540	T									NON-COM
		(T)	1.028	.754	.274	.000	.00	4	(H2-1)	
541	T									NON-COM
		(C)	.555	.381	.174	.000	80.02	1	(H1-1)	
		(T)	1.150	.747	.403	.000	80.02	4	(H2-1)	
542	T									NON-COM
		(C)	.555	.381	.174	.000	.00	1	(H1-1)	
		(T)	1.151	.747	.403	.000	.00	4	(H2-1)	
543	T									NON-COM
		(C)	.527	.334	.193	.000	80.02	1	(H1-1)	
		(T)	1.159	.678	.481	.000	80.02	4	(H2-1)	
544	T									NON-COM
		(C)	.527	.334	.193	.000	.00	1	(H1-1)	
		(T)	1.160	.679	.481	.000	.00	4	(H2-1)	
545	T									NON-COM
		(T)	1.104	.539	.564	.000	80.02	4	(H2-1)	
546	T									NON-COM
		(T)	1.104	.540	.564	.000	.00	4	(H2-1)	

Truss T1 Hangars 43 and 47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
547	T									NON-COM
		(T)	.847	.336	.511	.000	80.02	4	(H2-1)	
548	T									NON-COM
		(T)	.847	.337	.511	.000	.00	4	(H2-1)	
553	G									NON-COM
		(C)	1.003	.782	.220	.000	.00	4	(H1-1)	
554	G									NON-COM
		(C)	1.643	1.091	.552	.000	160.00	4	(H1-1)	
555	T									NON-COM
		(C)	1.241	.947	.294	.000	.00	4	(H1-1)	
556	T									NON-COM
		(C)	1.285	.953	.331	.000	160.00	4	(H1-1)	
557	T									NON-COM
		(C)	.871	.662	.209	.000	160.00	4	(H1-1)	
558	T									NON-COM
		(C)	.522	.373	.149	.000	.00	4	(H1-1)	
561	G									NON-COM
		(C)	.574	.480	.095	.000	160.00	1	(H1-1)	
		(T)	.976	.901	.075	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.840	.713	.127	.000	.00	1	(H1-1)	
		(T)	1.527	1.461	.065	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.855	.713	.142	.000	160.00	1	(H1-1)	
		(T)	1.527	1.461	.065	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.976	.901	.075	.000	160.00	4	(H2-1)	
567	T									NON-COM
		(C)	.522	.373	.149	.000	160.00	4	(H1-1)	
568	T									NON-COM
		(C)	.871	.662	.209	.000	.00	4	(H1-1)	
569	T									NON-COM
		(C)	1.285	.954	.332	.000	.00	4	(H1-1)	
570	T									NON-COM
		(C)	1.241	.947	.294	.000	160.00	4	(H1-1)	
571	G									NON-COM
		(C)	1.643	1.091	.552	.000	.00	4	(H1-1)	
572	G									NON-COM
		(C)	1.003	.782	.220	.000	160.00	4	(H1-1)	
577	G									NON-COM
		(T)	.690	.690	.000	.000	.00	4	(H2-1)	
				kl/r > 200						
578	G									NON-COM
		(T)	.508	.508	.000	.000	.00	4	(H2-1)	
579	G			kl/r > 200						NON-COM
580	G			kl/r > 200						NON-COM
581	G			kl/r > 200						NON-COM
582	G			kl/r > 200						NON-COM
583	G			kl/r > 200						NON-COM
		(C)	.678	.678	.000	.000	.00	1	(H1-1)	

Truss T1 Hangars 43 and 47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
584	G		kl/r > 200							NON-COM
		(C)	1.313	1.313	.000	.000	.00	1	(H1-1)	
		(T)	.621	.621	.000	.000	.00	4	(H2-1)	
585	G		kl/r > 200							NON-COM
		(C)	1.339	1.339	.000	.000	.00	1	(H1-1)	
		(T)	.769	.769	.000	.000	.00	4	(H2-1)	
586	G		kl/r > 200							NON-COM
		(C)	1.302	1.302	.000	.000	.00	1	(H1-1)	
		(T)	.725	.725	.000	.000	.00	4	(H2-1)	
587	G		kl/r > 200							NON-COM
		(C)	1.337	1.337	.000	.000	.00	1	(H1-1)	
		(T)	.853	.853	.000	.000	.00	4	(H2-1)	
588	W14X61									COMPACT
		(T)	.737	.737	.000	.000	200.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.811	1.811	.000	.000	.00	1	(H1-1)	
		(T)	.853	.853	.000	.000	.00	4	(H2-1)	
590	G		kl/r > 200							NON-COM
		(C)	1.724	1.724	.000	.000	.00	1	(H1-1)	
		(T)	.726	.726	.000	.000	.00	4	(H2-1)	
591	G		kl/r > 200							NON-COM
		(C)	1.966	1.966	.000	.000	.00	1	(H1-1)	
		(T)	.769	.769	.000	.000	.00	4	(H2-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.967	1.967	.000	.000	.00	1	(H1-1)	
		(T)	.621	.621	.000	.000	.00	4	(H2-1)	
593	G		kl/r > 200							NON-COM
		(C)	1.293	1.293	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
597	G		kl/r > 200							NON-COM
		(C)	1.141	1.141	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.263	1.263	.000	.000	.00	1	(H1-1)	
		(T)	.508	.508	.000	.000	.00	4	(H2-1)	
599	G									NON-COM
		(C)	1.345	1.345	.000	.000	.00	1	(H1-1)	
		(T)	.690	.690	.000	.000	.00	4	(H2-1)	
605	T		kl/r > 200							NON-COM
606	T		kl/r > 200							NON-COM
607	T		kl/r > 200							NON-COM
608	T		kl/r > 200							NON-COM
609	T		kl/r > 200							NON-COM
610	T		kl/r > 200							NON-COM
611	T		kl/r > 200							NON-COM
612	T		kl/r > 200							NON-COM
614	T		kl/r > 200							NON-COM
618	T		kl/r > 200							NON-COM
619	T		kl/r > 200							NON-COM

Truss T1 Hangars 43 and 47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
620	T		kl/r > 200							NON-COM
701	T	(C)	1.958	1.621	.337	.000	113.14	4	(H1-1)	NON-COM
702	T	(C)	1.890	1.582	.308	.000	.00	4	(H1-1)	NON-COM
703	T	(C)	1.630	1.475	.155	.000	114.32	4	(H1-1)	NON-COM
704	T	(C)	1.601	1.450	.151	.000	.00	4	(H1-1)	NON-COM
705	T		fa > Fe							NON-COM
706	T		fa > Fe							NON-COM
707	T		fa > Fe							NON-COM
708	T	(C)	1.801	.897	.903	.000	.00	4	(H1-1)	NON-COM
713	T	(C)	1.411	.954	.457	.000	.00	4	(H1-1)	NON-COM
714	T	(C)	1.605	1.028	.577	.000	121.67	4	(H1-1)	NON-COM
715	T		fa > Fe							NON-COM
716	T		fa > Fe							NON-COM
717	T		fa > Fe							NON-COM
718	T		fa > Fe							NON-COM
719	T		fa > Fe							NON-COM
720	T		fa > Fe							NON-COM
721	T		fa > Fe							NON-COM
722	T		fa > Fe							NON-COM
723	T		fa > Fe							NON-COM
724	T		fa > Fe							NON-COM
725	T		fa > Fe							NON-COM
726	T		fa > Fe							NON-COM
727	T		fa > Fe							NON-COM
728	T		fa > Fe							NON-COM
729	T		fa > Fe							NON-COM
730	T		fa > Fe							NON-COM
731	T		fa > Fe							NON-COM
732	T		fa > Fe							NON-COM
733	T		fa > Fe							NON-COM
734	T		fa > Fe							NON-COM
735	T	(C)	1.605	1.028	.577	.000	121.67	4	(H1-1)	NON-COM
736	T	(C)	1.411	.954	.457	.000	.00	4	(H1-1)	NON-COM
741	T	(C)	1.802	.897	.904	.000	.00	4	(H1-1)	NON-COM
742	T		fa > Fe							NON-COM
743	T		fa > Fe							NON-COM
744	T		fa > Fe							NON-COM
745	T	(C)	1.601	1.450	.151	.000	.00	4	(H1-1)	NON-COM

Truss T1 Hangars 43 and 47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
746	T									NON-COM
		(C)	1.630	1.475	.155	.000	114.32	4	(H1-1)	
747	T									NON-COM
		(C)	1.890	1.582	.308	.000	.00	4	(H1-1)	
		(T)	.543	.524	.019	.000	56.57	1	(H2-1)	
748	T									NON-COM
		(C)	1.958	1.621	.337	.000	113.14	4	(H1-1)	
		(T)	.542	.522	.019	.000	56.57	1	(H2-1)	
805	W18X46									COMPACT
		(T)	.621	.045	.575	.000	.00	2	(H2-1)	
808	W18X46									COMPACT
		(T)	.800	.045	.755	.000	78.00	2	(H2-1)	
809	W24X68									COMPACT
		(C)	.666	.026	.640	.000	.00	1	(H1-3)	
812	W24X68									COMPACT
		(C)	1.014	.026	.987	.000	78.00	1	(H1-3)	
817	W18X65									COMPACT
		(T)	.743	.017	.726	.000	180.50	1	(H2-1)	
820	W18X76									COMPACT
		(C)	1.031	.098	.933	.000	180.50	1	(H1-3)	
		(T)	.635	.084	.551	.000	180.50	2	(H2-1)	
821	W18X76									COMPACT
		(T)	.651	.181	.470	.000	.00	4	(H2-1)	
822	W18X76									COMPACT
		(T)	.563	.197	.366	.000	.00	4	(H2-1)	
835	W18X46									COMPACT
		(C)	.727	.056	.671	.000	.00	1	(H1-3)	
		(T)	.628	.064	.565	.000	.00	4	(H2-1)	
838	W18X46									COMPACT
		(C)	.728	.056	.673	.000	78.00	1	(H1-3)	
859	W24X68									COMPACT
		(T)	.672	.013	.658	.000	.00	1	(H2-1)	
862	W24X68									COMPACT
		(T)	.965	.013	.952	.000	78.00	1	(H2-1)	
867	W18X65									COMPACT
		(C)	.876	.112	.764	.000	180.50	1	(H1-3)	
868	W18X65									COMPACT
		(C)	.520	.025	.495	.000	.00	1	(H1-3)	
871	W18X76									COMPACT
		(C)	.643	.078	.565	.000	180.50	1	(H1-3)	
		(T)	.808	.109	.699	.000	180.50	2	(H2-1)	
872	W18X76									COMPACT
		(T)	.651	.181	.470	.000	.00	4	(H2-1)	
873	W18X76									COMPACT
		(T)	.563	.197	.366	.000	.00	4	(H2-1)	

Truss T2 Hangars 44 and 45

C SAP90 INPUT

```
system
L=10
C
C
C
joints
C      Truss Joints T2-a
  1  x=0     z=0                      y=0
 49  x=3840  z=0       g=1,49,2
 51  x=0     z=160
 75  x=1920  z=200     g=51,75,1
 99  x=3840  z=160     g=75,99,1
102  x=80    z=80
112  x=880   z=88.3333 g=102,112,2
114  x=1040  z=91.6667
124  x=1840  z=100     g=114,124,2
126  x=2000  z=100
136  x=2800  z=91.6667 g=126,136,2
138  x=2960  z=88.3333
148  x=3760  z=80      g=138,148,2
50   x=0     z=42
100  x=3840  z=42
166  x=1920  z=-384
C      Bracing Frame Joints T2-a
149  x=-390   z=42
150  x=-312   z=42
151  x=-390   z=0
152  x=-312   z=0
153  x=-312   z=-130
154  x=-0     z=-130
155  x=-390   z=-213
156  x=-312   z=-213
157  x=-312   z=-252
158  x=0      z=-252
161  x=-156   z=-65
162  x=-156   z=-191
163  x=-156   z=-318
164  x=-390   z=-384
165  x=-312   z=-384
167  x=0      z=-384
170  x=4152   z=42
171  x=4230   z=42
172  x=4152   z=0
173  x=4230   z=0
174  x=3840   z=-43
178  x=4152   z=-43
179  x=3840   z=-203.5
183  x=4152   z=-203.5
184  x=4230   z=-203.5
185  x=3840   z=-384
186  x=4152   z=-384
187  x=4230   z=-384
```

```
188  x=3996  z=-123.25
189  x=3996  z=-293.75

restraints
164  r=1,1,1,0,0,0
187  r=1,1,1,0,0,0
165  r=1,1,1,0,0,0
167  r=1,1,1,0,0,0
185  r=1,1,1,0,0,0
186  r=1,1,1,0,0,0
166    r=1,1,1,0,0,0
1 49 2 r=0,1,0,0,0,0
51 99 1 r=0,1,0,0,0,0
149 150 1 r=0,1,0,0,0,0
151 r=0,1,0,0,0,0
155 r=0,1,0,0,0,0
170 174 1  r=0,1,0,0,0,0
178 179 1 r=0,1,0,0,0,0
183 184 1 r=0,1,0,0,0,0

frame
nm=57 nl=18 z=-1,0,0,0,0,0,0,0,0,0
1  sh=216x3.5x3/8-3     w=.00205    E=29000
2  sh=218x6x1/2-3       w=.0038333
3  sh=216x6x3/8-3       w=.00248333
4  sh=213x3.5x5/16-3    w=.0011
5  sh=213x3x1/4-3       w=.00081667
6  sh=216x3.5x5/16-3    w=.0016333
7  sh=213x3x5/16-3      w=.00101667
8  sh=2L3.5X2.5X5/16-3  w=.001008333
9  sh=213x2.5x1/4-3     w=.00075
10 sh=213x2x5/16-3      w=.0008333
11 sh=216x6x1/2-3       w=.0030667
12 sh=218x6x1/2-3       w=.0038333
13 sh=214x3x5/16-3      w=.0012
14 sh=216x4x3/8-3       w=.00205
15 sh=215x3x1/4-3       w=.0011
16 sh=215x3.5x5/16-3    w=.00145
17 sh=w18x65            w=.00541667
18 sh=w24x68            w=.005667
19 sh=w18x46            w=.0038333
20 sh=w18x65            w=.00541667
21 sh=216x6x5/8-3       w=.0040333
22 sh=213x2.5x1/4-3     w=.00075
23 sh=w8x18             w=.0015
24 sh=w12x22            w=.0018333
25 sh=w10x22            w=.0018333
26 sh=w14x30            w=.0025
27 sh=w8x31             w=.00258333
28 sh=w12x26            w=.0021667
29 sh=w10x12            w=.001
30 sh=w10x22            w=.0018333
31 sh=14x3x1/4          w=.00048333
32 sh=13.5x2.5x1/4      w=.000408333
33 sh=215x3.5x3/8-3     w=.0017333
34 sh=w14x90            w=.0075
35 sh=w14x145           w=.01208333
```

```
36 sh=w33x201              w=.01675
37 sh=217x4x1/2            w=.00298
38 sh=w14x74               w=.0061667
39 sh=w14x43               w=.00358333
40 sh=215x3x5/16           w=.0013667
41 sh=s12x50               w=.0041667
42 sh=w14x61               w=.00508333
43 sh=w6x16                w=.001333
44 sh=213x2.5x1/4-3        w=.00075
45 sh=mc12x31              w=.00258333
46 sh=mc12x31              w=.00258333
47 sh=mc12x31              w=.00258333
48 sh=216x3.5x3/8-3        w=.00195
49 sh=215x3x5/16-3         w=.0013667
50 sh=215x5x3/8            w=.00205
51 sh=13x2.5x1/4           w=.000375
52 sh=13x2x1/4             w=.000341667
53 sh=w14x30               w=.0025
54 sh=215x3.5x5/16-3       w=.00145
55 sh=w14x34               w=.0028333
56 sh=14x3x5/16            w=.0006
57 sh=s10x35               w=.004
C       Live Load on braced frames
1 wg=0,0,-.08333     :100 psf---T2
C       Slab load on braced frames
2 wg=0,0,-.041667    :150pcfx4 in. ---T2
C         Roof Dead Loads
3 wg=0,0,-.0025
C         Roof Live Loads
4 wg=0,0,-.01667
C          Wind Span Loads
5  wg=.048333,0,0
6  wg=.0508333,0,0
7  wg=.0033,0,0
8  wg=-.011667,0,0
9  wg=.06,0,0
10 wg=-.015,0,0
11 wg=.015,0,0
12 wg=-.071667,0,0
13 wg=.071667,0,0
14 wg=-.048333,0,0
15 wg=-.0508333,0,0
16 wg=-.0033,0,0
17 wg=.011667,0,0
18 wg=-.06,0,0
C           Truss Elements T2-a
385  166  25   m=34 lp=2,0
88   25   75   m=34 lp=2,0
C                Bottom Chord (3 axis --- +Y)
51   1    3    m=11 lp=2,0 lr=1,0,0,0,0,0
52   3    5    m=11 lp=2,0           g=2,1,2,2
55   9    11   m=21 lp=2,0           g=3,1,2,2
59   17   19   m=11 lp=2,0           g=2,1,2,2
62   23   25   m=11 lp=2,0 lr=0,1,0,0,0,0
63   25   27   m=11 lp=2,0 lr=1,0,0,0,0,0
64   27   29   m=11 lp=2,0           g=2,1,2,2
67   33   35   m=21 lp=2,0           g=3,1,2,2
```

```
71    41    43    m=11 lp=2,0          g=2,1,2,2
74    47    49    m=11 lp=2,0 lr=0,1,0,0,0,0
C                Main Diagonal Bottom Section
202   102   3     m=14 lp=2,0 lr=0,1,0,0,0,0
204   104   5     m=6  lp=2,0 lr=0,1,0,0,0,0
206   106   7     m=15 lp=2,0 lr=0,1,0,0,0,0
208   108   9     m=8  lp=2,0 lr=0,1,0,0,0,0
210   110   11    m=9  lp=2,0 lr=0,1,0,0,0,0
212   112   13    m=13 lp=2,0 lr=0,1,0,0,0,0
213   114   13    m=10 lp=-2,0 lr=0,1,0,0,0,0
215   116   15    m=9  lp=-2,0 lr=0,1,0,0,0,0
217   118   17    m=8  lp=-2,0 lr=0,1,0,0,0,0
219   120   19    m=13 lp=-2,0 lr=0,1,0,0,0,0
221   122   21    m=6  lp=-2,0 lr=0,1,0,0,0,0
223   124   23    m=1  lp=-2,0 lr=0,1,0,0,0,0
226   126   27    m=1  lp=2,0 lr=0,1,0,0,0,0
228   128   29    m=6  lp=2,0 lr=0,1,0,0,0,0
230   130   31    m=13 lp=2,0 lr=0,1,0,0,0,0
232   132   33    m=8  lp=2,0 lr=0,1,0,0,0,0
234   134   35    m=9  lp=2,0 lr=0,1,0,0,0,0
236   136   37    m=10 lp=2,0 lr=0,1,0,0,0,0
237   138   37    m=13 lp=-2,0 lr=0,1,0,0,0,0
239   140   39    m=9  lp=-2,0 lr=0,1,0,0,0,0
241   142   41    m=8  lp=-2,0 lr=0,1,0,0,0,0
243   144   43    m=15 lp=-2,0 lr=0,1,0,0,0,0
245   146   45    m=6  lp=-2,0 lr=0,1,0,0,0,0
247   148   47    m=14 lp=-2,0 lr=0,1,0,0,0,0
C                Main Diagonal Top section
201   51    102   m=14 lp=2,0 lr=1,0,0,0,0,0
203   53    104   m=6  lp=2,0 lr=1,0,0,0,0,0
205   55    106   m=15 lp=2,0 lr=1,0,0,0,0,0
207   57    108   m=8  lp=2,0 lr=1,0,0,0,0,0
209   59    110   m=9  lp=2,0 lr=1,0,0,0,0,0
211   61    112   m=13 lp=2,0 lr=1,0,0,0,0,0
214   65    114   m=10 lp=-2,0 lr=1,0,0,0,0,0
216   67    116   m=9  lp=-2,0 lr=1,0,0,0,0,0
218   69    118   m=8  lp=-2,0 lr=1,0,0,0,0,0
220   71    120   m=13 lp=-2,0 lr=1,0,0,0,0,0
222   73    122   m=6  lp=-2,0 lr=1,0,0,0,0,0
224   75    124   m=1  lp=-2,0  lr=1,0,0,0,0,0
225   75    126   m=1  lp=2,0   lr=1,0,0,0,0,0
227   77    128   m=6  lp=2,0 lr=1,0,0,0,0,0
229   79    130   m=13 lp=2,0 lr=1,0,0,0,0,0
231   81    132   m=8  lp=2,0 lr=1,0,0,0,0,0
233   83    134   m=9  lp=2,0 lr=1,0,0,0,0,0
235   85    136   m=10 lp=2,0 lr=1,0,0,0,0,0
238   89    138   m=13 lp=-2,0 lr=1,0,0,0,0,0
240   91    140   m=9  lp=-2,0 lr=1,0,0,0,0,0
242   93    142   m=8  lp=-2,0 lr=1,0,0,0,0,0
244   95    144   m=15 lp=-2,0 lr=1,0,0,0,0,0
246   97    146   m=6  lp=-2,0 lr=1,0,0,0,0,0
248   99    148   m=14 lp=-2,0 lr=1,0,0,0,0,0
C                Diagonal Brace
126   53    102   m=5  lp=2,0        g=5,1,2,2 lr=1,1,0,0,0,0
132   63    114   m=5  lp=-2,0       g=5,1,2,2 lr=1,1,0,0,0,0
138   77    126   m=5  lp=2,0        g=5,1,2,2 lr=1,1,0,0,0,0
144   87    138   m=5  lp=-2,0       g=5,1,2,2 lr=1,1,0,0,0,0
```

```
C                 Vertical Brace
101  102  52   m=5  lp=2,0     g=10,1,2,2 lr=1,1,0,0,0,0
112  124  74   m=22 lp=2,0  lr=1,1,0,0,0,0
113  126  76   m=22 lp=-2,0  lr=1,1,0,0,0,0
114  128  78   m=5  lp=-2,0    g=10,1,2,2 lr=1,1,0,0,0,0
C                 Top Chord (3 axis ------  -Z)
1    51   52   m=12  lp=-2,0 lr=1,0,0,0,0,0
2    52   53   m=12  lp=-2,0         g=21,1,1,1
24   74   75   m=12  lp=-2,0 lr=0,1,0,0,0,0
25   75   76   m=12  lp=-2,0 lr=1,0,0,0,0,0
26   76   77   m=12  lp=-2,0         g=21,1,1,1
48   98   99   m=12  lp=-2,0 lr=0,1,0,0,0,0
C                 South Vertical Member
76   50   51   m=20 lp=2,0 nsl=0,0,6,8,0,0,10,12,16,18 \
                                     lr=1,1,0,0,0,0
50   1    50   m=20 lp=2,0 nsl=0,0,6,8,0,0,10,12,16,18 \
                                     lr=1,1,0,0,0,0
77   3    53   m=14 lp=2,0     g=1,1,2,2 lr=1,1,0,0,0,0
79   7    57   m=6  lp=2,0     g=5,1,2,2 lr=1,1,0,0,0,0
85   19   69   m=14 lp=2,0     g=2,1,2,2 lr=1,1,0,0,0,0
89   27   77   m=14 lp=-2,0    g=2,1,2,2 lr=1,1,0,0,0,0
92   33   83   m=6  lp=-2,0    g=5,1,2,2 lr=1,1,0,0,0,0
98   45   95   m=14 lp=-2,0    g=1,1,2,2 lr=1,1,0,0,0,0
100  100  99   m=20 lp=2,0 nsl=0,0,7,9,0,0,11,13,15,17 \
                                     lr=1,1,0,0,0,0
49   49  100   m=20 lp=2,0 nsl=0,0,7,9,0,0,11,13,15,17 \
                                     lr=1,1,0,0,0,0
C       Bracing Frame Elements
301 149  150  m=23   lp=2,0
302 150  50   m=24   lp=2,0
303 151  152  m=25   lp=2,0
304 152  1    m=26   lp=2,0
305 153  154  m=57   lp=2,0
306 155  156  m=25   lp=2,0
307 157  158  m=57   lp=2,0
310 164  155  m=27   lp=3,0
311 155  151  m=27   lp=3,0
316 151  149  m=27   lp=3,0
319 152  150  m=19   lp=2,0
312 165  157  m=19   lp=2,0
314 157  156  m=19   lp=2,0
315 156  153  m=19   lp=2,0
317 153  152  m=19   lp=2,0
318 167  158  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
320 158  154  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
321 154    1  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
322 153  161  m=8    lp=2,0
323 161    1  m=8    lp=2,0
324 152  161  m=8    lp=2,0
325 161  154  m=8    lp=2,0
326 157  162  m=8    lp=2,0
327 162  154  m=8    lp=2,0
328 153  162  m=8    lp=2,0
329 162  158  m=8    lp=2,0
330 165  163  m=8    lp=2,0
331 163  158  m=8    lp=2,0
332 157  163  m=8    lp=2,0
```

```
333 163  167  m=8    lp=2,0
351 100  170  m=24   lp=2,0
352 170  171  m=23   lp=2,0
353 49   172  m=26   lp=2,0
354 172  173  m=25   lp=2,0
355 174  178  m=26   lp=2,0   nsl=3,0,0,0,0,4,0,0,0,0
359 179  183  m=19   lp=2,0   nsl=2,1,0,0,0,0,0,0,0,0
363 183  184  m=25   lp=2,0
364 187  184  m=27   lp=3,0
365 184  173  m=27   lp=3,0
366 173  171  m=27   lp=3,0
367 186  183  m=19   lp=2,0   nsl=0,0,7,9,0,0,11,13,14,17
368 183  178  m=19   lp=2,0   nsl=0,0,7,9,0,0,11,13,14,17
369 178  172  m=19   lp=2,0
370 172  170  m=19   lp=2,0
371 185  179  m=20   lp=2,0
372 179  174  m=20   lp=2,0
373 174  49   m=20   lp=2,0   nsl=0,0,7,9,0,0,11,13,14,17
374 174  188  m=8    lp=-2,0
375 188  183  m=8    lp=-2,0
376 179  188  m=8    lp=-2,0
377 188  178  m=8    lp=-2,0
378 179  189  m=8    lp=-2,0
379 189  186  m=8    lp=-2,0
380 185  189  m=8    lp=-2,0
381 189  183  m=8    lp=-2,0

loads
51 99 48 l=1 f=0,0,-.376
52 54  1 l=1 f=0,0,-.737
55       l=1 f=0,0,-.832
56 58 1  l=1 f=0,0,-.737
59       l=1 f=0,0,-.832
60 62 1  l=1 f=0,0,-.737
63       l=1 f=0,0,-.952
64 66 1  l=1 f=0,0,-.737
67       l=1 f=0,0,-.832
68 70 1  l=1 f=0,0,-.737
71       l=1 f=0,0,-.832
72 74 1  l=1 f=0,0,-.737
75       l=1 f=0,0,-1.46
76 78 1  l=1 f=0,0,-.737
79       l=1 f=0,0,-.832
80 82 1  l=1 f=0,0,-.737
83       l=1 f=0,0,-.832
84 86 1  l=1 f=0,0,-.737
87       l=1 f=0,0,-.952
88 90 1  l=1 f=0,0,-.737
91       l=1 f=0,0,-.832
92 94 1  l=1 f=0,0,-.737
95       l=1 f=0,0,-.832
96 98 1  l=1 f=0,0,-.737
51 99 48 l=1 f=0,0,-.3
52 98 1  l=1 f=0,0,-.6
51  99 48 l=1 f=0,0,-.347
55 59 4   l=1 f=0,0,-.557
63 87 24  l=1 f=0,0,-.322
```

```
67 71 4     l=1 f=0,0,-.557
75          l=1 f=0,0,-.163
79 83 4     l=1 f=0,0,-.557
91 95 4     l=1 f=0,0,-.557
9 17 8      l=1 f=0,0,-.1775
33 41 8     l=1 f=0,0,-.1775
51 99 48    l=6 f=0,0,-.66667
52 98 1     l=6 f=0,0,-1.3333
1 49 48     l=2 f=0,0,-.533
3 23 2      l=2 f=0,0,-1.066
27 47 2     l=2 f=0,0,-1.066
155         l=3 f=12.11,0,0
184         l=3 f=.83,0,0
155         l=4 f=-2.91,0,0
184         l=4 f=15,0,0
51          l=3 f=0,0,.867
52 57 1     l=3 f=0,0,1.73
58          l=3 f=0,0,.833
59 64 1     l=3 f=0,0,.533
65 98 1     l=3 f=0,0,-.2
99          l=3 f=0,0,-.1
51          l=4 f=0,0,3.13
52 57 1     l=4 f=0,0,6.27
58          l=4 f=0,0,5.37
59 64 1     l=4 f=0,0,5.07
65 98 1     l=4 f=0,0,4.33
99          l=4 f=0,0,2.17
3 23 2      l=5 f=0,0,-.5
27 47 2     l=5 f=0,0,-.5
155         l=7 f=-3.74,0,0
184         l=7 f=3.74,0,0
155         l=8 f=-17.9,0,0
184         l=8 f=17.9,0,0
51          l=7 f=0,0,.967
52 98 1     l=7 f=0,0,1.933
99          l=7 f=0,0,.967
51          l=8 f=0,0,3.2
52 98 1     l=8 f=0,0,6.4
99          l=8 f=0,0,3.2
184         l=9 f=-12.11,0,0
155         l=9 f=-.83,0,0
99          l=9 f=0,0,.867
93 98 1     l=9 f=0,0,1.73
92          l=9 f=0,0,.833
86 91 1     l=9 f=0,0,.533
52 85 1     l=9 f=0,0,-.2
51          l=9 f=0,0,-.1
184         l=10 f=2.91,0,0
155         l=10 f=-15,0,0
99          l=10 f=0,0,3.13
93 98 1     l=10 f=0,0,6.27
92          l=10 f=0,0,5.37
86 91 1     l=10 f=0,0,5.07
52 85 1     l=10 f=0,0,4.33
51          l=10 f=0,0,2.17
```

Truss T2 Hangars 44 and 45

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,0,0,0,0
2 c=1,0,0,1,1,0,0,0,0,0
3 c=1,0,0,0,1,0,1,0,0,0
4 c=1,0,0,0,1,0,0,1,0,0
5 c=1,0,0,0,1,0,0,0,1,0
6 c=1,0,0,0,1,0,0,0,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1             :2L8x6x1/2
58 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5            :2L3x2.5x1/4
59 mn=s sh=g e=29000 fy=36 a=5.74 i=16.0,28.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8            :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.75 \
 as=3.75,3.75 z=11.34,10.25 t=9.13,11              :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5            :2L3x2x1/4
62 mn=s sh=w14x90 e=29000
63 mn=s sh=w14x90 e=29000
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625        :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.25,.5            :2L5x3x1/4
66 mn=s sh=w14x90 e=29000
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1             :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5            :2L3x2.5x1/4
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625        :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.93 \
 as=3.8,2.2 z=9.7,5.5 t=7.98,7.375                 :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,92.4 \
 as=8,8 z=30.1,36.9 t=11.65,16.37                  :2L8x8x1/2
73 mn=s sh=g e=29000 fy=36 a=16.29 i=147,277   \
  as=6.7,2.4 z=55.6,28.3 t=16.7,12.35              :2C-12x40,10x15.3
74 mn=s sh=t e=29000 fy=36 t=6,12,.6875,1.375 :2L6x6x11/16
75 mn=s sh=t e=29000 fy=36 t=6,7,.375,.75          :2L6x3.5x3/8

frame
223 226 1 m=75
1  48 1 m=57
51 54 1 m=67
55 58 1 m=74
67 70 1 m=74
207     m=68
242     m=68
223 226 1 m=67
71 74 1 m=67
62 63 1 m=67
77 78 1 m=60 l=1,.5
79      m=71 l=1,.5
80 84 1 m=59 l=1,.5
85 87 1 m=60 l=1,.5
89 91 1 m=60 l=1,.5
```

```
92 96 1 m=59 l=1,.5
97       m=71 l=1,.5
98 99 1 m=60 l=1,.5
101 124 1 m=58
126 149 1 m=61
201 202 1 m=60
203 204 1 m=71
205 206 1 m=65
211 212 1 m=64
213 214 1 m=70
215 216 1 m=69
217 218 1 m=68
219 220 1 m=64
221 222 1 m=71
227 228 1 m=71
229 230 1 m=64
231 232 1 m=68
233 234 1 m=69
235 236 1 m=70
237 238 1 m=64
243 244 1 m=65
245 246 1 m=71
247 248 1 m=60
374 381 1 m=68
385          l=.5,.5
371          l=1,.001
367 368 1 l=1,.001
355 359 4 l=1,.001
322 333 1 m=68
318          l=1,.001
320 321 1 l=1,.001
305 307 2 m=73
```

Truss T2 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
62	T	(C)	.511	.432	.079	.000	.00	5	(H1-1)	NON-COM
63	T	(C)	.511	.432	.079	.000	160.00	1	(H1-1)	NON-COM
201	G	(C)	.548	.387	.161	.000	113.14	4	(H1-1)	NON-COM
202	G	(C)	.532	.372	.159	.000	.00	4	(H1-1)	NON-COM
205	T	(C)	.591	.494	.097	.000	115.52	4	(H1-1)	NON-COM
206	T	(C)	.565	.469	.096	.000	.00	4	(H1-1)	NON-COM
213	T	(C)	1.211	1.014	.196	.000	.00	4	(H1-1)	NON-COM
214	T	(C)	1.336	1.101	.236	.000	121.67	4	(H1-1)	NON-COM
215	T		fa > Fe							NON-COM
216	T		fa > Fe							NON-COM
217	T	(C)	1.665	1.120	.545	.000	.00	4	(H1-1)	NON-COM
218	T	(C)	1.700	1.129	.571	.000	124.20	4	(H1-1)	NON-COM
219	T	(C)	1.181	.896	.284	.000	.00	4	(H1-1)	NON-COM
220	T	(C)	1.191	.902	.289	.000	125.48	4	(H1-1)	NON-COM
221	G	(C)	.781	.660	.121	.000	.00	4	(H1-1)	NON-COM
222	G	(C)	.789	.667	.122	.000	126.77	4	(H1-1)	NON-COM
227	G	(C)	.789	.667	.122	.000	126.77	4	(H1-1)	NON-COM
228	G	(C)	.781	.660	.122	.000	.00	4	(H1-1)	NON-COM
229	T	(C)	1.191	.902	.289	.000	125.48	4	(H1-1)	NON-COM
230	T	(C)	1.181	.896	.284	.000	.00	4	(H1-1)	NON-COM
231	T	(C)	1.700	1.129	.571	.000	124.20	4	(H1-1)	NON-COM
232	T	(C)	1.665	1.120	.545	.000	.00	4	(H1-1)	NON-COM
233	T		fa > Fe							NON-COM
234	T		fa > Fe							NON-COM
235	T	(C)	1.336	1.101	.236	.000	121.67	4	(H1-1)	NON-COM
236	T	(C)	1.210	1.014	.196	.000	.00	4	(H1-1)	NON-COM
243	T	(C)	.565	.469	.096	.000	.00	4	(H1-1)	NON-COM

Truss T2 Hangars 44 and 45

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
244	T									NON-COM
		(C)	.591	.494	.097	.000	115.52	4	(H1-1)	
247	G									NON-COM
		(C)	.532	.372	.159	.000	.00	4	(H1-1)	
248	G									NON-COM
		(C)	.548	.387	.161	.000	113.14	4	(H1-1)	
302	W12X22		1/r > 300							COMPACT
		(C)	1.042	.802	.240	.000	.00	4	(H1-1)	
304	W14X30		kl/r > 200							COMPACT
322	T									NON-COM
		(C)	.581	.475	.106	.000	.00	5	(H1-1)	
323	T									NON-COM
		(C)	.532	.449	.083	.000	.00	5	(H1-1)	
326	T									NON-COM
		(C)	.523	.426	.096	.000	.00	5	(H1-1)	
330	T									NON-COM
		(C)	1.113	.888	.225	.000	.00	6	(H1-1)	
331	T									NON-COM
		(C)	1.002	.863	.139	.000	169.39	6	(H1-1)	
332	T									NON-COM
		(C)	.886	.751	.135	.000	169.39	1	(H1-1)	
333	T									NON-COM
		(C)	.983	.776	.207	.000	169.39	1	(H1-1)	
351	W12X22		kl/r > 200							COMPACT
		(C)	.950	.802	.148	.000	312.00	4	(H1-1)	
353	W14X30		kl/r > 200							COMPACT
374	T									NON-COM
		(C)	.638	.530	.108	.000	175.43	1	(H1-1)	
375	T									NON-COM
		(C)	.680	.554	.126	.000	.00	1	(H1-1)	
376	T									NON-COM
		(C)	.566	.451	.115	.000	175.43	6	(H1-1)	
377	T									NON-COM
		(C)	.513	.426	.087	.000	.00	6	(H1-1)	
378	T									NON-COM
		(C)	1.179	.949	.230	.000	180.23	2	(H1-1)	
379	T									NON-COM
		(C)	1.448	.974	.474	.000	180.23	2	(H1-1)	
380	T									NON-COM
		(C)	1.251	.946	.305	.000	.00	5	(H1-1)	
381	T									NON-COM
		(C)	1.116	.922	.195	.000	.00	5	(H1-1)	

Truss T2 Hangars 43 and 47

C SAP90 INPUT

```
system
L=8
C
C
C
joints
C      Truss Joints T2-a
166 x=1920  z=-384                          y=0
  1  x=0     z=0                            y=0
 49  x=3840 z=0        g=1,49,2
 51  x=0     z=160
 75  x=1920 z=200      g=51,75,1
 99  x=3840 z=160      g=75,99,1
102  x=80    z=80
112  x=880   z=88.3333 g=102,112,2
114  x=1040 z=91.6667
124  x=1840 z=100      g=114,124,2
126  x=2000 z=100
136  x=2800 z=91.6667 g=126,136,2
138  x=2960 z=88.3333
148  x=3760 z=80       g=138,148,2
50   x=0     z=42
100  x=3840 z=42
C      Bracing Frame Joints T2-a
149  x=-390  z=42
150  x=-312  z=42
151  x=-390  z=0
152  x=-312  z=0
153  x=-312  z=-43
154  x=-234  z=-43
155  x=-156  z=-43
156  x=-78   z=-43
157  x=0     z=-43
158  x=-390  z=-203.5
159  x=-312  z=-203.5
163  x=0     z=-203.5  g=159,163,1
164  x=-390  z=-384
165  x=-312  z=-384
167  x=0     z=-384
168  x=-156  z=-123.25
169  x=-156  z=-293.75
170  x=4152  z=42
171  x=4230  z=42
172  x=4152  z=0
173  x=4230  z=0
174  x=3840  z=-43
178  x=4152  z=-43     g=174,178,1
179  x=3840  z=-203.5
183  x=4152  z=-203.5  g=179,183,1
184  x=4230  z=-203.5
185  x=3840  z=-384
186  x=4152  z=-384
```

```
187  x=4230  z=-384
188  x=3996  z=-123.25
189  x=3996  z=-293.75

restraints
164  r=1,1,1,0,0,0
187  r=1,1,1,0,0,0
165  r=1,1,1,0,0,0
167  r=1,1,1,0,0,0
185  r=1,1,1,0,0,0
186  r=1,1,1,0,0,0
166  r=1,1,1,0,0,0
1 49 2 r=0,1,0,0,0,0
51 99 1 r=0,1,0,0,0,0
149 163 1 r=0,1,0,0,0,0
170 184 1  r=0,1,0,0,0,0

frame
nm=56 nl=13 z=-1,0,0,0,0,0,0,0
1  sh=216x3.5x3/8-3      w=.00205      E=29000
2  sh=218x6x1/2-3        w=.0038333
3  sh=216x6x3/8-3        w=.00248333
4  sh=213x3.5x5/16-3     w=.0011
5  sh=213x3x1/4-3        w=.00081667
6  sh=216x3.5x5/16-3     w=.0016333
7  sh=213x3x5/16-3       w=.00101667
8  sh=2L3.5X2.5X5/16-3   w=.001008333
9  sh=213x2.5x1/4-3      w=.00075
10 sh=213x2x5/16-3       w=.0008333
11 sh=216x6x1/2-3        w=.0030667
12 sh=218x6x1/2-3        w=.0038333
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
```

```
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
C       Live Load on braced frames
1 wg=0,0,-.08333    :100 psf---T2
C       Slab load on braced frames
2 wg=0,0,-.041667   :150pcfx4 in. ---T2
C        Roof Dead Loads
3 wg=0,0,-.0025
C        Roof Live Loads
4 wg=0,0,-.016667
C         Wind Span Loads
5  wg=.048333,0,0
6  wg=.0508333,0,0
7  wg=.0033,0,0
8  wg=-.011667,0,0
9  wg=.06,0,0
10 wg=-.015,0,0
11 wg=.015,0,0
12 wg=-.071667,0,0
13 wg=.071667,0,0
C          Truss Elements T2-a
385  166  25   m=34 lp=2,0
88   25   75   m=34 lp=2,0
C              Bottom Chord (3 axis --- +Y)
51   1    3    m=11 lp=2,0 lr=1,0,0,0,0,0
52   3    5    m=11 lp=2,0         g=2,1,2,2
55   9    11   m=21 lp=2,0         g=3,1,2,2
59   17   19   m=11 lp=2,0         g=2,1,2,2
62   23   25   m=11 lp=2,0 lr=0,1,0,0,0,0
63   25   27   m=11 lp=2,0 lr=1,0,0,0,0,0
64   27   29   m=11 lp=2,0         g=2,1,2,2
67   33   35   m=21 lp=2,0         g=3,1,2,2
71   41   43   m=11 lp=2,0         g=2,1,2,2
74   47   49   m=11 lp=2,0 lr=0,1,0,0,0,0
C             Main Diagonal Bottom Section
202  102  3    m=14 lp=2,0  lr=0,1,0,0,0,0
204  104  5    m=6  lp=2,0  lr=0,1,0,0,0,0
206  106  7    m=15 lp=2,0  lr=0,1,0,0,0,0
208  108  9    m=8  lp=2,0  lr=0,1,0,0,0,0
210  110  11   m=9  lp=2,0  lr=0,1,0,0,0,0
212  112  13   m=13 lp=2,0  lr=0,1,0,0,0,0
```

```
213   114   13    m=10 lp=-2,0 lr=0,1,0,0,0,0
215   116   15    m=9  lp=-2,0 lr=0,1,0,0,0,0
217   118   17    m=8  lp=-2,0 lr=0,1,0,0,0,0
219   120   19    m=13 lp=-2,0 lr=0,1,0,0,0,0
221   122   21    m=6  lp=-2,0 lr=0,1,0,0,0,0
223   124   23    m=1  lp=-2,0 lr=0,1,0,0,0,0
226   126   27    m=1  lp=2,0  lr=0,1,0,0,0,0
228   128   29    m=6  lp=2,0 lr=0,1,0,0,0,0
230   130   31    m=13 lp=2,0 lr=0,1,0,0,0,0
232   132   33    m=8  lp=2,0 lr=0,1,0,0,0,0
234   134   35    m=9  lp=2,0 lr=0,1,0,0,0,0
236   136   37    m=10 lp=2,0 lr=0,1,0,0,0,0
237   138   37    m=13 lp=-2,0 lr=0,1,0,0,0,0
239   140   39    m=9  lp=-2,0 lr=0,1,0,0,0,0
241   142   41    m=8  lp=-2,0 lr=0,1,0,0,0,0
243   144   43    m=15 lp=-2,0 lr=0,1,0,0,0,0
245   146   45    m=6  lp=-2,0 lr=0,1,0,0,0,0
247   148   47    m=14 lp=-2,0 lr=0,1,0,0,0,0
C                Main Diagonal Top section
201   51    102   m=14 lp=2,0  lr=1,0,0,0,0,0
203   53    104   m=6  lp=2,0  lr=1,0,0,0,0,0
205   55    106   m=15 lp=2,0  lr=1,0,0,0,0,0
207   57    108   m=8  lp=2,0  lr=1,0,0,0,0,0
209   59    110   m=9  lp=2,0  lr=1,0,0,0,0,0
211   61    112   m=13 lp=2,0  lr=1,0,0,0,0,0
214   65    114   m=10 lp=-2,0 lr=1,0,0,0,0,0
216   67    116   m=9  lp=-2,0 lr=1,0,0,0,0,0
218   69    118   m=8  lp=-2,0 lr=1,0,0,0,0,0
220   71    120   m=13 lp=-2,0 lr=1,0,0,0,0,0
222   73    122   m=6  lp=-2,0 lr=1,0,0,0,0,0
224   75    124   m=1  lp=-2,0 lr=1,0,0,0,0,0
225   75    126   m=1  lp=2,0  lr=1,0,0,0,0,0
227   77    128   m=6  lp=2,0  lr=1,0,0,0,0,0
229   79    130   m=13 lp=2,0  lr=1,0,0,0,0,0
231   81    132   m=8  lp=2,0  lr=1,0,0,0,0,0
233   83    134   m=9  lp=2,0  lr=1,0,0,0,0,0
235   85    136   m=10 lp=2,0  lr=1,0,0,0,0,0
238   89    138   m=13 lp=-2,0 lr=1,0,0,0,0,0
240   91    140   m=9  lp=-2,0 lr=1,0,0,0,0,0
242   93    142   m=8  lp=-2,0 lr=1,0,0,0,0,0
244   95    144   m=15 lp=-2,0 lr=1,0,0,0,0,0
246   97    146   m=6  lp=-2,0 lr=1,0,0,0,0,0
248   99    148   m=14 lp=-2,0 lr=1,0,0,0,0,0
C                Diagonal Brace
126   53    102   m=5  lp=2,0     lr=1,1,0,0,0,0    g=5,1,2,2
132   63    114   m=5  lp=-2,0    lr=1,1,0,0,0,0    g=5,1,2,2
138   77    126   m=5  lp=2,0     lr=1,1,0,0,0,0    g=5,1,2,2
144   87    138   m=5  lp=-2,0    lr=1,1,0,0,0,0    g=5,1,2,2
C                Vertical Brace
101   102   52    m=5  lp=2,0     lr=1,1,0,0,0,0    g=10,1,2,2
112   124   74    m=22 lp=2,0     lr=1,1,0,0,0,0
113   126   76    m=22 lp=-2,0    lr=1,1,0,0,0,0
114   128   78    m=5  lp=-2,0    lr=1,1,0,0,0,0    g=10,1,2,2
C                 Top Chord (3 axis ------  -Z)
1     51    52    m=12  lp=-2,0  lr=1,0,0,0,0,0
2     52    53    m=12  lp=-2,0                   g=21,1,1,1
24    74    75    m=12  lp=-2,0 lr=0,1,0,0,0,0
```

```
25   75   76   m=12  lp=-2,0 lr=1,0,0,0,0,0
26   76   77   m=12  lp=-2,0                   g=21,1,1,1
48   98   99   m=12  lp=-2,0 lr=0,1,0,0,0,0
C             South Vertical Member
76   50   51   m=20 lp=2,0  nsl=0,0,6,8,0,0,10,12 lr=1,1,0,0,0,0
50   1    50   m=20 lp=2,0  nsl=0,0,6,8,0,0,10,12 lr=1,1,0,0,0,0
77   3    53   m=14 lp=2,0          g=1,1,2,2     lr=1,1,0,0,0,0
79   7    57   m=6  lp=2,0          g=5,1,2,2     lr=1,1,0,0,0,0
85   19   69   m=14 lp=2,0          g=2,1,2,2     lr=1,1,0,0,0,0
89   27   77   m=14 lp=-2,0         g=2,1,2,2     lr=1,1,0,0,0,0
92   33   83   m=6  lp=-2,0         g=5,1,2,2     lr=1,1,0,0,0,0
98   45   95   m=14 lp=-2,0         g=1,1,2,2     lr=1,1,0,0,0,0
100  100  99   m=20 lp=2,0  nsl=0,0,7,9,0,0,11,13 lr=1,1,0,0,0,0
49   49   100  m=20 lp=2,0  nsl=0,0,7,9,0,0,11,13 lr=1,1,0,0,0,0
C      Bracing Frame Elements
301 149  150  m=23  lp=2,0
302 150  50   m=24  lp=2,0
303 151  152  m=25  lp=2,0
304 152  1    m=26  lp=2,0
305 153  154  m=26  lp=2,0   nsl=3,0,0,0,0,4,0,0  g=3,1,1,1
309 159  160  m=19  lp=2,0   nsl=2,1,0,0,0,0,0,0  g=3,1,1,1
313 158  159  m=25  lp=2,0
314 164  158  m=27  lp=3,0
315 158  151  m=27  lp=3,0
316 151  149  m=27  lp=3,0
317 165  159  m=19  lp=2,0   nsl=0,0,5,8,0,0,10,12
318 159  153  m=19  lp=2,0   nsl=0,0,5,8,0,0,10,12
331 153  152  m=19  lp=2,0
319 152  150  m=19  lp=2,0
320 167  163  m=20  lp=2,0
321 163  157  m=20  lp=2,0
322 157  1    m=20  lp=2,0   nsl=0,0,5,8,0,0,10,12
323 153  168  m=8   lp=-2,0
324 168  163  m=8   lp=-2,0
325 159  168  m=8   lp=-2,0
326 168  157  m=8   lp=-2,0
327 159  169  m=8   lp=-2,0
328 169  167  m=8   lp=-2,0
329 165  169  m=8   lp=-2,0
330 169  163  m=8   lp=-2,0
351 100  170  m=24  lp=2,0
352 170  171  m=23  lp=2,0
353 49   172  m=26  lp=2,0
354 172  173  m=25  lp=2,0
355 174  175  m=26  lp=2,0   nsl=3,0,0,0,0,4,0,0  g=3,1,1,1
359 179  180  m=19  lp=2,0   nsl=2,1,0,0,0,0,0,0  g=3,1,1,1
363 183  184  m=25  lp=2,0
364 187  184  m=27  lp=3,0
365 184  173  m=27  lp=3,0
366 173  171  m=27  lp=3,0
367 186  183  m=19  lp=2,0   nsl=0,0,7,9,0,0,11,13
368 183  178  m=19  lp=2,0   nsl=0,0,7,9,0,0,11,13
369 178  172  m=19  lp=2,0
370 172  170  m=19  lp=2,0
371 185  179  m=20  lp=2,0
372 179  174  m=20  lp=2,0
373 174  49   m=20  lp=2,0   nsl=0,0,7,9,0,0,11,13
```

```
374 174  188  m=8   lp=-2,0
375 188  183  m=8   lp=-2,0
376 179  188  m=8   lp=-2,0
377 188  178  m=8   lp=-2,0
378 179  189  m=8   lp=-2,0
379 189  186  m=8   lp=-2,0
380 185  189  m=8   lp=-2,0
381 189  183  m=8   lp=-2,0

loads
51 99 48 l=1 f=0,0,-.376
52 54  1 l=1 f=0,0,-.737
55       l=1 f=0,0,-.832
56 58 1  l=1 f=0,0,-.737
59       l=1 f=0,0,-.832
60 62 1  l=1 f=0,0,-.737
63       l=1 f=0,0,-.952
64 66 1  l=1 f=0,0,-.737
67       l=1 f=0,0,-.832
68 70 1  l=1 f=0,0,-.737
71       l=1 f=0,0,-.832
72 74 1  l=1 f=0,0,-.737
75       l=1 f=0,0,-1.46
76 78 1  l=1 f=0,0,-.737
79       l=1 f=0,0,-.832
80 82 1  l=1 f=0,0,-.737
83       l=1 f=0,0,-.832
84 86 1  l=1 f=0,0,-.737
87       l=1 f=0,0,-.952
88 90 1  l=1 f=0,0,-.737
91       l=1 f=0,0,-.832
92 94 1  l=1 f=0,0,-.737
95       l=1 f=0,0,-.832
96 98 1  l=1 f=0,0,-.737
51 99 48 l=1 f=0,0,-.3
52 98 1  l=1 f=0,0,-.6
51  99 48 l=1 f=0,0,-.347
55 59 4   l=1 f=0,0,-.557
63 87 24  l=1 f=0,0,-.322
67 71 4   l=1 f=0,0,-.557
75        l=1 f=0,0,-.163
79 83 4   l=1 f=0,0,-.557
91 95 4   l=1 f=0,0,-.557
9 17 8    l=1 f=0,0,-.1775
33 41 8   l=1 f=0,0,-.1775
51 99 48  l=6 f=0,0,-.667
52 98 1   l=6 f=0,0,-1.333
1 49 48   l=2 f=0,0,-.533
3 23 2    l=2 f=0,0,-1.066
27 47 2   l=2 f=0,0,-1.066
158       l=3 f=10.83,0,0
149 151 2 l=3 f=.64,0,0
184       l=3 f=.746,0,0
171 173 2 l=3 f=.042,0,0
158       l=4 f=2.62,0,0
149 151 2 l=4 f=.145,0,0
184       l=4 f=13.5,0,0
```

```
171 173 2 l=4 f=.75,0,0
51        l=3 f=0,0,.867
52 57 1   l=3 f=0,0,1.73
58        l=3 f=0,0,.833
59 64 1   l=3 f=0,0,.533
65 98 1   l=3 f=0,0,-.2
99        l=3 f=0,0,-.1
51        l=4 f=0,0,3.13
52 57 1   l=4 f=0,0,6.27
58        l=4 f=0,0,5.37
59 64 1   l=4 f=0,0,5.07
65 98 1   l=4 f=0,0,4.33
99        l=4 f=0,0,2.17
3 23 2    l=5 f=0,0,-.5
27 47 2   l=5 f=0,0,-.5
158       l=7 f=-3.37,0,0
149 151 2 l=7 f=-.18,0,0
184       l=7 f=-3.37,0,0
171 173 2 l=7 f=-.18,0,0
51        l=7 f=0,0,.967
52 57 1   l=7 f=0,0,1.933
58        l=7 f=0,0,1.933
59 64 1   l=7 f=0,0,1.933
65 98 1   l=7 f=0,0,1.933
99        l=7 f=0,0,.967
51        l=8 f=0,0,3.2
52 57 1   l=8 f=0,0,6.4
58        l=8 f=0,0,6.4
59 64 1   l=8 f=0,0,6.4
65 98 1   l=8 f=0,0,6.4
99        l=8 f=0,0,3.2
```

Truss T2 Hangars 43 and 47

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,0,0
2 c=1,0,0,1,1,0,0,0
3 c=1,0,0,0,1,0,1,0
4 c=1,0,0,0,1,0,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
58 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5         :2L3x2.5x1/4
59 mn=s sh=g e=29000 fy=36 a=5.74 i=16.0,28.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8         :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.75 \
 as=3.75,3.75 z=11.34,10.25 t=9.13,11           :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=w14x90 e=29000
63 mn=s sh=w14x90 e=29000
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.25,.5         :2L5x3x1/4
66 mn=s sh=w14x90 e=29000
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5         :2L3x2.5x1/4
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.93 \
 as=3.8,2.2 z=9.7,5.5 t=7.98,7.375              :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,92.4 \
 as=8,8 z=30.1,36.9 t=11.65,16.37               :2L8x8x1/2
73 mn=s sh=g e=29000 fy=36 a=16.29 i=147,277   \
  as=6.7,2.4 z=55.6,28.3 t=16.7,12.35           :2C-12x40,10x15.3
74 mn=s sh=t e=29000 fy=36 t=6,7,.375,.75        :2L6x3.5x3/8

frame
1   48 1 m=57
62  63 1 m=67
77  78 1 m=60 l=1,.5
79       m=71 l=1,.5
80  84 1 m=59 l=1,.5
85  87 1 m=60 l=1,.5
89  91 1 m=60 l=1,.5
92  96 1 m=59 l=1,.5
97       m=71 l=1,.5
98  99 1 m=60 l=1,.5
101 124 1 m=58
126 149 1 m=61
201 202 1 m=60
203 204 1 m=71
205 206 1 m=65
211 212 1 m=64
213 214 1 m=70
215 216 1 m=69
```

```
217 218 1 m=68
219 220 1 m=64
221 222 1 m=71
223 226 1 m=74
227 228 1 m=71
229 230 1 m=64
231 232 1 m=68
233 234 1 m=69
235 236 1 m=70
237 238 1 m=64
243 244 1 m=65
245 246 1 m=71
247 248 1 m=60
374 381 1 m=68
323 330 1 m=68
317 318 1 l=1,.001
320        l=1,.001
305 312 1 l=1,.001
385        l=.5,.5
371        l=1,.001
367 368 1 l=1,.001
355 362 1 l=1,.001
```

Truss T2 Hangars 43 and 47 **Retrofit: None**

T2-47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
62	T									NON-COM
		(C)	.509	.432	.078	.000	.00	1	(H1-1)	
63	T									NON-COM
		(C)	.511	.432	.079	.000	160.00	1	(H1-1)	
201	G									NON-COM
		(C)	.542	.383	.159	.000	113.14	4	(H1-1)	
202	G									NON-COM
		(C)	.526	.368	.158	.000	.00	4	(H1-1)	
205	T									NON-COM
		(C)	.581	.485	.095	.000	115.52	4	(H1-1)	
206	T									NON-COM
		(C)	.554	.460	.094	.000	.00	4	(H1-1)	
213	T									NON-COM
		(C)	1.244	1.038	.206	.000	.00	4	(H1-1)	
214	T									NON-COM
		(C)	1.375	1.125	.250	.000	121.67	4	(H1-1)	
215	T			fa > Fe						NON-COM
216	T			fa > Fe						NON-COM
217	T									NON-COM
		(C)	1.713	1.132	.581	.000	.00	4	(H1-1)	
218	T									NON-COM
		(C)	1.752	1.141	.611	.000	124.20	4	(H1-1)	
219	T									NON-COM
		(C)	1.194	.904	.290	.000	.00	4	(H1-1)	
220	T									NON-COM
		(C)	1.205	.910	.295	.000	125.48	4	(H1-1)	
221	G									NON-COM
		(C)	.786	.664	.121	.000	.00	4	(H1-1)	
222	G									NON-COM
		(C)	.794	.672	.122	.000	126.77	4	(H1-1)	
223	T									NON-COM
		(C)	.827	.708	.119	.000	.00	4	(H1-1)	
224	T									NON-COM
		(C)	.846	.726	.120	.000	128.06	4	(H1-1)	
225	T									NON-COM
		(C)	.846	.726	.120	.000	128.06	4	(H1-1)	
226	T									NON-COM
		(C)	.827	.708	.119	.000	.00	4	(H1-1)	
227	G									NON-COM
		(C)	.794	.672	.122	.000	126.77	4	(H1-1)	
228	G									NON-COM
		(C)	.786	.664	.121	.000	.00	4	(H1-1)	
229	T									NON-COM
		(C)	1.205	.910	.295	.000	125.48	4	(H1-1)	
230	T									NON-COM
		(C)	1.194	.904	.290	.000	.00	4	(H1-1)	
231	T									NON-COM
		(C)	1.752	1.141	.611	.000	124.20	4	(H1-1)	
232	T									NON-COM
		(C)	1.713	1.132	.581	.000	.00	4	(H1-1)	

T2-47

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
233	T		fa > Fe							NON-COM
234	T		fa > Fe							NON-COM
235	T									NON-COM
		(C)	1.375	1.125	.250	.000	121.67	4	(H1-1)	
236	T									NON-COM
		(C)	1.244	1.038	.206	.000	.00	4	(H1-1)	
243	T									NON-COM
		(C)	.554	.460	.094	.000	.00	4	(H1-1)	
244	T									NON-COM
		(C)	.581	.485	.095	.000	115.52	4	(H1-1)	
247	G									NON-COM
		(C)	.526	.368	.158	.000	.00	4	(H1-1)	
248	G									NON-COM
		(C)	.542	.383	.159	.000	113.14	4	(H1-1)	
302	W12X22		l/r > 300							COMPACT
		(C)	.977	.802	.175	.000	.00	4	(H1-1)	
304	W14X30		kl/r > 200							COMPACT
323	T									NON-COM
		(C)	.507	.421	.086	.000	175.43	2	(H1-1)	
324	T									NON-COM
		(C)	.560	.445	.114	.000	.00	2	(H1-1)	
327	T									NON-COM
		(C)	1.126	.928	.198	.000	180.23	1	(H1-1)	
328	T									NON-COM
		(C)	1.263	.953	.310	.000	180.23	1	(H1-1)	
329	T									NON-COM
		(C)	.509	.386	.123	.000	.00	3	(H1-1)	
351	W12X22		kl/r > 200							COMPACT
		(C)	.977	.802	.175	.000	312.00	4	(H1-1)	
353	W14X30		kl/r > 200							COMPACT
374	T									NON-COM
		(C)	.633	.525	.108	.000	175.43	1	(H1-1)	
375	T									NON-COM
		(C)	.674	.550	.125	.000	.00	1	(H1-1)	
378	T									NON-COM
		(C)	1.244	.988	.256	.000	180.23	2	(H1-1)	
379	T									NON-COM
		(C)	1.550	1.013	.537	.000	180.23	2	(H1-1)	

Truss T3 Hangars 44 and 45 Average Wind

c SAP90 INPUT

```
system
L=8
C
C
C
joints
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333  E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
13 sh=214x3x5/16-3        w=.0012
```

```
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 a=14.7 j=200 i=597,288 as=9.29,9.9 e=29000 w=.005
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
9000 6470 6471 m=41 lp=1,0
9001 6480 6481 m=41 lp=1,0
7375 6482 6483 m=41 lp=1,0
```

7376	6470	6472	m=34	lp=2,0
7377	6472	25	m=34	lp=2,0
7378	25	75	m=34	lp=2,0
7379	6471	6473	m=35	lp=2,0
7380	6473	525	m=35	lp=2,0
7381	525	575	m=35	lp=2,0
7382	1025	1075	m=42	lp=2,0
7383	1525	1575	m=39	lp=2,0
7384	2025	2075	m=39	lp=2,0
7385	2525	2575	m=42	lp=2,0
7386	3025	3075	m=36	lp=2,0
7387	3525	3575	m=42	lp=2,0
7388	4025	4075	m=39	lp=2,0
7389	4525	4575	m=39	lp=2,0
7390	5025	5075	m=42	lp=2,0
7391	6480	6482	m=35	lp=2,0
7392	6482	5525	m=35	lp=2,0
7393	5525	5575	m=35	lp=2,0
7394	6481	6483	m=34	lp=2,0
7395	6483	6025	m=34	lp=2,0
7396	6025	6075	m=34	lp=2,0
7397	6478	3025	m=36	lp=2,0
7398	6470	6474	m=37	lp=2,0
7399	6474	6473	m=37	lp=2,0
7400	6472	6475	m=37	lp=2,0
7401	6475	525	m=37	lp=2,0
7402	25	6476	m=37	lp=2,0
7403	6476	575	m=37	lp=2,0
7405	6472	6474	m=37	lp=2,0
7406	6474	6471	m=37	lp=2,0
7407	25	6475	m=37	lp=2,0
7408	6475	6473	m=37	lp=2,0
7409	75	6476	m=37	lp=2,0
7410	6476	525	m=37	lp=2,0
7411	575	1025	m=38	lp=2,0
7412	1075	1525	m=39	lp=2,0
7413	1525	6477	m=40	lp=2,0
7414	6477	2075	m=40	lp=2,0
7415	1575	6477	m=40	lp=2,0
7416	6477	2025	m=40	lp=2,0
7417	2025	2575	m=39	lp=2,0
7418	2525	3075	m=38	lp=2,0
7419	3075	3525	m=38	lp=2,0
7420	3575	4025	m=39	lp=2,0
7421	4025	6479	m=40	lp=2,0
7422	6479	4575	m=40	lp=2,0
7423	4075	6479	m=40	lp=2,0
7424	6479	4525	m=40	lp=2,0
7425	4525	5075	m=39	lp=2,0
7426	5025	5575	m=38	lp=2,0
7427	5525	6486	m=37	lp=2,0
7428	6486	6075	m=37	lp=2,0
7429	5575	6486	m=37	lp=2,0
7430	6486	6025	m=37	lp=2,0
7431	6482	6485	m=37	lp=2,0
7432	6485	6025	m=37	lp=2,0
7433	5525	6485	m=37	lp=2,0

```
7434 6485 6483 m=37 lp=2,0
7435 6480 6484 m=37 lp=2,0
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0

loads
C Dead Loads
25   6025 500  l=1 f=0,0,-27.35
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-1.43
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live Load
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,-3.7
575  5575 500  l=4 f=0,0,-7.4
C Wind II
75   6075 6000 l=5 f=0,0,105
575  5575 500  l=5 f=0,0,210
C Wind III
75             l=6 f=0,0,8.1
575  5575 500  l=6 f=0,0,16.2
6075           l=6 f=0,0,8.1
25             l=6 f=0,148.5,0
25   75   50   l=6 f=0,73.2,0
6025           l=6 f=0,20.5,0
6025 6075 50   l=6 f=0,10.1,0
C Wind IV
75             l=7 f=0,0,71.1
575  5575 500  l=7 f=0,0,142.2
6075           l=7 f=0,0,71.1
25             l=7 f=0,-25.6,0
25   75   50   l=7 f=0,-12.7,0
6025           l=7 f=0,220,0
6025 6075 50   l=7 f=0,109,0
C  P loads
25   6025 500  l=8 f=0,0,-6
```

Truss T3 Hangars 44 and 45 **Average Wind**

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14                :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                    :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                   :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14              :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62             :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3    \
   as=8,8 z=36.9,30.1 t=8,16.375                   :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36                    :14-H-78
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154   \
   as=15.8,16 z=169,52.5 t=10.13,14                :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
```

Truss T3 Hangars 44 and 45 Retrofit: None
Average Wind Loading

Truss T3 Hangars 44 and 45 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7352	G									NON-COM
		(T)	.506	.349	.000	.157	240.00	2	(H2-1)	
7359	G									NON-COM
		(T)	.506	.349	.000	.157	.00	2	(H2-1)	
7363	W14X74									COMPACT
		(C)	.584	.323	.000	.261	.00	1	(H1-1)	
		(T)	.529	.419	.000	.110	240.00	4	(H2-1)	
7364	W14X74									COMPACT
		(C)	.647	.447	.000	.200	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	1.064	.625	.000	.439	.00	2	(H1-1)	
7367	W14X74									COMPACT
		(C)	1.333	.767	.000	.566	240.00	1	(H1-1)	
		(T)	.919	.730	.000	.189	240.00	2	(H2-1)	
7368	W14X74									COMPACT
		(C)	1.333	.767	.000	.566	.00	1	(H1-1)	
		(T)	.919	.730	.000	.189	.00	2	(H2-1)	
7370	G									NON-COM
		(C)	1.064	.625	.000	.439	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.647	.447	.000	.200	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	.882	.539	.000	.343	240.00	3	(H1-1)	
7373	G									NON-COM
		(T)	.571	.444	.000	.127	240.00	4	(H2-1)	
7379	W14X145									COMPACT
		(C)	.970	.783	.000	.187	.00	3	(H1-1)	
7380	W14X145									COMPACT
		(C)	.657	.559	.000	.098	192.00	1	(H1-1)	
		(T)	.541	.447	.000	.094	192.00	2	(H2-1)	
7381	W14X145									COMPACT
		(T)	.506	.461	.000	.045	.00	2	(H2-1)	
7382	W14X61									COMPACT
		(C)	.608	.438	.000	.170	200.00	1	(H1-1)	
		(T)	.909	.680	.000	.229	200.00	2	(H2-1)	
7383	W14X43									COMPACT
		(T)	.576	.504	.000	.072	.00	2	(H2-1)	
7384	W14X43									NON-COM
		(T)	.785	.629	.000	.156	.00	2	(H2-1)	
7385	W14X61									COMPACT
		(C)	.912	.604	.000	.308	200.00	1	(H1-1)	
		(T)	1.179	.854	.000	.325	200.00	2	(H2-1)	
7386	W33X201									NON-COM
		(C)	.550	.550	.000	.000	.00	1	(H1-1)	
		(T)	.591	.591	.000	.000	.00	2	(H2-1)	
7387	W14X61									COMPACT
		(C)	.912	.604	.000	.308	200.00	1	(H1-1)	
		(T)	1.179	.854	.000	.325	200.00	2	(H2-1)	
7388	W14X43									NON-COM
		(T)	.785	.629	.000	.156	.00	2	(H2-1)	

Truss T3 Hangars 44 and 45 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7389	W14X43									COMPACT
		(T)	.576	.504	.000	.072	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.608	.438	.000	.170	200.00	1	(H1-1)	
		(T)	.909	.680	.000	.229	200.00	2	(H2-1)	
7391	W14X145									COMPACT
		(C)	.535	.514	.000	.021	192.00	1	(H1-1)	
		(T)	.563	.499	.000	.065	.00	4	(H2-1)	
7392	W14X145									COMPACT
		(C)	.657	.559	.000	.098	192.00	1	(H1-1)	
		(T)	.541	.447	.000	.094	192.00	2	(H2-1)	
7393	W14X145									COMPACT
		(T)	.506	.461	.000	.045	.00	2	(H2-1)	
7394	W14X90									COMPACT
		(C)	1.043	.794	.000	.249	.00	4	(H1-1)	
7395	W14X90									COMPACT
		(C)	.537	.353	.000	.184	192.00	4	(H1-1)	
7397	W33X201									NON-COM
		(C)	.687	.687	.000	.000	384.00	1	(H1-1)	
		(T)	.558	.558	.000	.000	384.00	2	(H2-1)	
7405	G									NON-COM
		(C)	.632	.590	.000	.042	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	.676	.593	.000	.083	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	.761	.695	.000	.067	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	.804	.698	.000	.106	153.67	3	(H1-1)	
7411	W14X74			fa > Fe						COMPACT
7412	W14X43			fa > Fe						NON-COM
7417	W14X43			fa > Fe						NON-COM
7418	W14X74			fa > Fe						COMPACT
7419	W14X74			fa > Fe						COMPACT
7420	W14X43			fa > Fe						NON-COM
7425	W14X43			fa > Fe						NON-COM
7426	W14X74			fa > Fe						COMPACT
7431	G									NON-COM
		(T)	.735	.671	.000	.063	153.67	4	(H2-1)	
7432	G									NON-COM
		(T)	.753	.674	.000	.079	.00	4	(H2-1)	
7433	G									NON-COM
		(C)	.660	.607	.000	.052	153.67	4	(H1-1)	
7434	G									NON-COM
		(C)	.681	.612	.000	.068	153.67	4	(H1-1)	
7435	G									NON-COM
		(T)	.604	.552	.000	.052	153.67	4	(H2-1)	
7436	G									NON-COM
		(T)	.603	.554	.000	.049	153.67	4	(H2-1)	
7437	G									NON-COM
		(C)	.824	.772	.000	.052	76.84	4	(H1-1)	

Truss T3 Hangars 44 and 45 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7438	G									NON-COM
		(C)	.836	.775	.000	.060	153.67	4	(H1-1)	

Truss T3 Hangars 44 and 45 **Stepped Wind Loading**

c **SAP90 INPUT**

```
system
L=8
C
C
C
joints
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76                w=.006333  E=29000
2  sh=218x6x1/2-3           w=.0038333
3  sh=216x6x3/8-3           w=.00248333
4  sh=213x3.5x5/16-3        w=.0011
5  sh=213x3x1/4-3           w=.00081667
6  sh=216x3.5x5/16-3        w=.0016333
7  sh=213x3x5/16-3          w=.00101667
8  sh=2L3.5X2.5X5/16-3      w=.001008333
9  sh=213x2.5x1/4-3         w=.00075
10 sh=213x2x5/16-3          w=.0008333
11 sh=216x6x1/2-3           w=.0030667
12 sh=218x6x1/2-3           w=.0038333
13 sh=214x3x5/16-3          w=.0012
```

```
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
7375 6482 6483 m=41 lp=1,0
7376 6470 6472 m=34 lp=2,0
7377 6472   25 m=34 lp=2,0
```

7378	25	75	m=34	lp=2,0
7379	6471	6473	m=35	lp=2,0
7380	6473	525	m=35	lp=2,0
7381	525	575	m=35	lp=2,0
7382	1025	1075	m=42	lp=2,0
7383	1525	1575	m=39	lp=2,0
7384	2025	2075	m=39	lp=2,0
7385	2525	2575	m=42	lp=2,0
7386	3025	3075	m=36	lp=2,0
7387	3525	3575	m=42	lp=2,0
7388	4025	4075	m=39	lp=2,0
7389	4525	4575	m=39	lp=2,0
7390	5025	5075	m=42	lp=2,0
7391	6480	6482	m=35	lp=2,0
7392	6482	5525	m=35	lp=2,0
7393	5525	5575	m=35	lp=2,0
7394	6481	6483	m=34	lp=2,0
7395	6483	6025	m=34	lp=2,0
7396	6025	6075	m=34	lp=2,0
7397	6478	3025	m=36	lp=2,0
7398	6470	6474	m=37	lp=2,0
7399	6474	6473	m=37	lp=2,0
7400	6472	6475	m=37	lp=2,0
7401	6475	525	m=37	lp=2,0
7402	25	6476	m=37	lp=2,0
7403	6476	575	m=37	lp=2,0
7405	6472	6474	m=37	lp=2,0
7406	6474	6471	m=37	lp=2,0
7407	25	6475	m=37	lp=2,0
7408	6475	6473	m=37	lp=2,0
7409	75	6476	m=37	lp=2,0
7410	6476	525	m=37	lp=2,0
7411	575	1025	m=38	lp=2,0
7412	1075	1525	m=39	lp=2,0
7413	1525	6477	m=40	lp=2,0
7414	6477	2075	m=40	lp=2,0
7415	1575	6477	m=40	lp=2,0
7416	6477	2025	m=40	lp=2,0
7417	2025	2575	m=39	lp=2,0
7418	2525	3075	m=38	lp=2,0
7419	3075	3525	m=38	lp=2,0
7420	3575	4025	m=39	lp=2,0
7421	4025	6479	m=40	lp=2,0
7422	6479	4575	m=40	lp=2,0
7423	4075	6479	m=40	lp=2,0
7424	6479	4525	m=40	lp=2,0
7425	4525	5075	m=39	lp=2,0
7426	5025	5575	m=38	lp=2,0
7427	5525	6486	m=37	lp=2,0
7428	6486	6075	m=37	lp=2,0
7429	5575	6486	m=37	lp=2,0
7430	6486	6025	m=37	lp=2,0
7431	6482	6485	m=37	lp=2,0
7432	6485	6025	m=37	lp=2,0
7433	5525	6485	m=37	lp=2,0
7434	6485	6483	m=37	lp=2,0
7435	6480	6484	m=37	lp=2,0

```
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0

loads
C Dead Loads
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-1.43
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live Load
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,3.925
575  5575 500  l=4 f=0,0,7.85
C Wind II
75   6075 6000 l=5 f=0,0,108
575  5575 500  l=5 f=0,0,216
C Wind III
75             l=6 f=0,0,46.4
575            l=6 f=0,0,92.8
1075           l=6 f=0,0,59.2
1575           l=6 f=0,0,25.6
2075           l=6 f=0,0,8
2575 5575 500  l=6 f=0,0,-9.6
6075           l=6 f=0,0,-4.8
25             l=6 f=0,149,0
25   75   50   l=6 f=0,82,0
1575           l=6 f=0,103,0
4575           l=6 f=0,111,0
6025           l=6 f=0,41,0
6025 6075 50   l=6 f=0,10.5,0
C Wind IV
75             l=7 f=0,0,153.6
575            l=7 f=0,0,307.2
1075           l=7 f=0,0,275.2
1575           l=7 f=0,0,243.2
2075           l=7 f=0,0,225.6
2575 5575 500  l=7 f=0,0,208
6075           l=7 f=0,0,104
25             l=7 f=0,25.6,0
25   75   50   l=7 f=0,21.6,0
4575           l=7 f=0,18,0
6025           l=7 f=0,220,0
6025 6075 50   l=7 f=0,109,0
```

```
C  P loads
25    6025 500  1=8 f=0,0,-3
```

Truss T3 Hangars 44 and 45 Stepped Wind Loading

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14              :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                  :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                 :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14            :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62           :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                 :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36                  :14-H-78
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154  \
   as=15.8,16 z=169,52.5 t=10.13,14              :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
```

Truss T3 Hangars 44 and 45 **Retrofit: None**
Stepped Wind Loading

T3-44 All Conditions .5 Minimum

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7351	W14X90	(T)	.729	.487	.000	.242	.00	4	(H2-1)	COMPACT
7352	G	(T)	.775	.560	.000	.214	240.00	4	(H2-1)	NON-COM
7353	G	(T)	.678	.495	.000	.183	.00	4	(H2-1)	NON-COM
7354	G	(T)	.697	.487	.000	.210	.00	4	(H2-1)	NON-COM
7355	W14X90	(T)	.634	.214	.000	.420	240.00	4	(H2-1)	COMPACT
7356	W14X90	(T)	.601	.202	.000	.398	.00	4	(H2-1)	COMPACT
7357	G	(T)	.676	.472	.000	.204	240.00	4	(H2-1)	NON-COM
7358	G	(T)	.655	.493	.000	.162	240.00	4	(H2-1)	NON-COM
7359	G	(T)	.724	.543	.000	.181	.00	4	(H2-1)	NON-COM
7360	W14X90	(T)	.749	.563	.000	.185	.00	4	(H2-1)	COMPACT
7363	W14X74	(T)	1.077	.724	.000	.354	.00	4	(H2-1)	COMPACT
7364	W14X74	(C)	.859	.574	.000	.285	240.00	2	(H1-1)	COMPACT
7365	G	(C)	1.646	.790	.000	.856	.00	2	(H1-1)	NON-COM
7367	W14X74	(C)	.854	.524	.000	.330	240.00	3	(H1-1)	COMPACT
		(T)	1.327	1.089	.000	.237	240.00	4	(H2-1)	
7368	W14X74	(C)	.694	.519	.000	.175	.00	3	(H1-1)	COMPACT
		(T)	1.390	1.092	.000	.298	.00	4	(H2-1)	
7370	G	(C)	1.646	.790	.000	.856	240.00	2	(H1-1)	NON-COM
7371	W14X74	(C)	.859	.574	.000	.285	.00	2	(H1-1)	COMPACT
7372	W14X74	(C)	1.559	.819	.000	.739	240.00	3	(H1-1)	COMPACT
		(T)	.609	.381	.000	.228	240.00	2	(H2-1)	
7373	G	(T)	.532	.499	.000	.033	240.00	4	(H2-1)	NON-COM
7376	W14X90	(T)	.748	.700	.000	.048	192.00	3	(H2-1)	COMPACT
7379	W14X145	(C)	.511	.479	.000	.032	192.00	3	(H1-1)	COMPACT
		(T)	.550	.544	.000	.007	192.00	2	(H2-1)	
7380	W14X145	(T)	.877	.668	.000	.209	192.00	4	(H2-1)	COMPACT
7381	W14X145	(T)	.849	.728	.000	.121	200.00	4	(H2-1)	COMPACT

T3-44 All Conditions .5 Minimum

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7382	W14X61									COMPACT
		(T)	1.329	.971	.000	.357	200.00	4	(H2-1)	
7383	W14X43									COMPACT
		(T)	.678	.575	.000	.103	.00	4	(H2-1)	
7384	W14X43									COMPACT
		(T)	.907	.691	.000	.216	.00	4	(H2-1)	
7385	W14X61									COMPACT
		(C)	.579	.421	.000	.157	200.00	3	(H1-1)	
		(T)	1.442	1.004	.000	.438	200.00	4	(H2-1)	
7386	W33X201									NON-COM
		(T)	.780	.726	.000	.054	.00	4	(H2-1)	
7387	W14X61									COMPACT
		(T)	1.423	.993	.000	.430	200.00	4	(H2-1)	
7388	W14X43									COMPACT
		(T)	.874	.658	.000	.216	.00	4	(H2-1)	
7389	W14X43									COMPACT
		(T)	.592	.508	.000	.085	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.676	.479	.000	.197	200.00	3	(H1-1)	
		(T)	1.041	.765	.000	.276	200.00	2	(H2-1)	
7391	W14X145									COMPACT
		(T)	.900	.878	.000	.022	192.00	4	(H2-1)	
7392	W14X145									COMPACT
		(T)	.693	.577	.000	.116	192.00	2	(H2-1)	
7393	W14X145									COMPACT
		(T)	.640	.550	.000	.091	200.00	2	(H2-1)	
7394	W14X90									COMPACT
		(C)	.802	.734	.000	.068	192.00	4	(H1-1)	
7395	W14X90									COMPACT
		(C)	.568	.431	.000	.137	.00	4	(H1-1)	
7397	W33X201									NON-COM
		(C)	.529	.406	.000	.123	384.00	3	(H1-1)	
		(T)	.789	.717	.000	.071	384.00	4	(H2-1)	
7398	G									NON-COM
		(T)	.847	.791	.000	.056	153.67	3	(H2-1)	
7399	G									NON-COM
		(T)	.857	.793	.000	.064	153.67	3	(H2-1)	
7400	G									NON-COM
		(T)	.774	.708	.000	.066	153.67	4	(H2-1)	
7401	G									NON-COM
		(T)	.755	.711	.000	.045	.00	4	(H2-1)	
7405	G									NON-COM
		(C)	1.011	.920	.000	.092	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	1.105	.923	.000	.182	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	1.064	.996	.000	.068	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	1.177	.999	.000	.178	153.67	3	(H1-1)	

T3-44 All Conditions .5 Minimum

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS = RATIO	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7409	G	(T)	.504	.437	.000	.068	.00	4	(H2-1)	NON-COM
7411	W14X74		fa > Fe							COMPACT
7412	W14X43		fa > Fe							NON-COM
7415	G	(T)	.688	.669	.000	.020	.00	4	(H2-1)	NON-COM
7416	G	(T)	.682	.666	.000	.016	156.20	4	(H2-1)	NON-COM
7417	W14X43		fa > Fe							NON-COM
7418	W14X74		fa > Fe							COMPACT
7419	W14X74		fa > Fe							COMPACT
7420	W14X43		fa > Fe							NON-COM
7421	G	(T)	.746	.731	.000	.014	.00	4	(H2-1)	NON-COM
7422	G	(T)	.750	.734	.000	.016	156.20	4	(H2-1)	NON-COM
7425	W14X43		fa > Fe							NON-COM
7426	W14X74		fa > Fe							COMPACT
7431	G	(T)	.857	.777	.000	.079	153.67	4	(H2-1)	NON-COM
7432	G	(T)	.864	.780	.000	.083	.00	4	(H2-1)	NON-COM
7433	G	(C)	.949	.870	.000	.079	.00	3	(H1-1)	NON-COM
7434	G	(C)	1.029	.874	.000	.156	153.67	3	(H1-1)	NON-COM
7435	G	(T)	.719	.646	.000	.073	153.67	4	(H2-1)	NON-COM
7436	G	(T)	.715	.648	.000	.068	153.67	4	(H2-1)	NON-COM
7437	G	(C)	.941	.849	.000	.091	38.42	3	(H1-1)	NON-COM
7438	G	(C)	1.019	.853	.000	.166	153.67	3	(H1-1)	NON-COM

c **SAP90 INPUT**

```
system
L=8
C
C
C
joints
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333  E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
13 sh=214x3x5/16-3        w=.0012
```

```
14 sh=216x4x3/8-3          w=.00205
15 sh=215x3x1/4-3          w=.0011
16 sh=215x3.5x5/16-3       w=.00145
17 sh=w18x65               w=.00541667
18 sh=w24x68               w=.005667
19 sh=w18x46               w=.0038333
20 sh=w18x65               w=.00541667
21 sh=216x6x5/8-3          w=.0040333
22 sh=213x2.5x1/4-3        w=.00075
23 sh=w8x18                w=.0015
24 sh=w12x22               w=.0018333
25 sh=w10x22               w=.0018333
26 sh=w14x30               w=.0025
27 sh=w8x31                w=.00258333
28 sh=w12x26               w=.0021667
29 sh=w10x12               w=.001
30 sh=w10x22               w=.0018333
31 sh=14x3x1/4             w=.00048333
32 sh=13.5x2.5x1/4         w=.000408333
33 sh=215x3.5x3/8-3        w=.0017333
34 sh=w14x90               w=.0075
35 sh=w14x145              w=.01208333
36 sh=w33x201              w=.01675
37 sh=217x4x1/2            w=.00298
38 sh=w14x74               w=.0061667
39 sh=w14x43               w=.00358333
40 sh=215x3x5/16           w=.0013667
41 a=14.7 j=200 i=597,288 as=9.29,9.9 e=29000 w=.005
42 sh=w14x61               w=.00508333
43 sh=w6x16                w=.001333
44 sh=213x2.5x1/4-3        w=.00075
45 sh=mc12x31              w=.00258333
46 sh=mc12x31              w=.00258333
47 sh=mc12x31              w=.00258333
48 sh=216x3.5x3/8-3        w=.00195
49 sh=215x3x5/16-3         w=.0013667
50 sh=215x5x3/8            w=.00205
51 sh=13x2.5x1/4           w=.000375
52 sh=13x2x1/4             w=.000341667
53 sh=w14x30               w=.0025
54 sh=215x3.5x5/16-3       w=.00145
55 sh=w14x34               w=.0028333
56 sh=14x3x5/16            w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
9000 6470 6471 m=30 lp=1,0
9001 6480 6481 m=30 lp=1,0
7375 6482 6483 m=41 lp=1,0
```

7376	6470	6472	m=34	1p=2,0
7377	6472	25	m=34	1p=2,0
7378	25	75	m=34	1p=2,0
7379	6471	6473	m=35	1p=2,0
7380	6473	525	m=35	1p=2,0
7381	525	575	m=35	1p=2,0
7382	1025	1075	m=42	1p=2,0
7383	1525	1575	m=39	1p=2,0
7384	2025	2075	m=39	1p=2,0
7385	2525	2575	m=42	1p=2,0
7386	3025	3075	m=36	1p=2,0
7387	3525	3575	m=42	1p=2,0
7388	4025	4075	m=39	1p=2,0
7389	4525	4575	m=39	1p=2,0
7390	5025	5075	m=42	1p=2,0
7391	6480	6482	m=35	1p=2,0
7392	6482	5525	m=35	1p=2,0
7393	5525	5575	m=35	1p=2,0
7394	6481	6483	m=34	1p=2,0
7395	6483	6025	m=34	1p=2,0
7396	6025	6075	m=34	1p=2,0
7397	6478	3025	m=36	1p=2,0
7398	6470	6474	m=37	1p=2,0
7399	6474	6473	m=37	1p=2,0
7400	6472	6475	m=37	1p=2,0
7401	6475	525	m=37	1p=2,0
7402	25	6476	m=37	1p=2,0
7403	6476	575	m=37	1p=2,0
7405	6472	6474	m=37	1p=2,0
7406	6474	6471	m=37	1p=2,0
7407	25	6475	m=37	1p=2,0
7408	6475	6473	m=37	1p=2,0
7409	75	6476	m=37	1p=2,0
7410	6476	525	m=37	1p=2,0
7411	575	1025	m=38	1p=2,0
7412	1075	1525	m=39	1p=2,0
7413	1525	6477	m=40	1p=2,0
7414	6477	2075	m=40	1p=2,0
7415	1575	6477	m=40	1p=2,0
7416	6477	2025	m=40	1p=2,0
7417	2025	2575	m=39	1p=2,0
7418	2525	3075	m=38	1p=2,0
7419	3075	3525	m=38	1p=2,0
7420	3575	4025	m=39	1p=2,0
7421	4025	6479	m=40	1p=2,0
7422	6479	4575	m=40	1p=2,0
7423	4075	6479	m=40	1p=2,0
7424	6479	4525	m=40	1p=2,0
7425	4525	5075	m=39	1p=2,0
7426	5025	5575	m=38	1p=2,0
7427	5525	6486	m=37	1p=2,0
7428	6486	6075	m=37	1p=2,0
7429	5575	6486	m=37	1p=2,0
7430	6486	6025	m=37	1p=2,0
7431	6482	6485	m=37	1p=2,0
7432	6485	6025	m=37	1p=2,0
7433	5525	6485	m=37	1p=2,0

```
7434 6485 6483 m=37 lp=2,0
7435 6480 6484 m=37 lp=2,0
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0

loads
C Dead
25   6025 500  l=1 f=0,0,-27.35
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-4.6
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,-3.7
575  5575 500  l=4 f=0,0,-7.4
C Wind II
75   6075 6000 l=5 f=0,0,105
575  5575 500  l=5 f=0,0,210
C Wind III
75             l=6 f=0,0,8.1
575  5575 500  l=6 f=0,0,16.2
6075           l=6 f=0,0,8.1
25             l=6 f=0,148.5,0
25   75   50   l=6 f=0,73.2,0
1575           l=6 f=0,110.6,0
4575           l=6 f=0,110.6,0
6025           l=6 f=0,20.5,0
6025 6075 50   l=6 f=0,10.1,0
C Wind IV
75             l=7 f=0,0,71.1
575  5575 500  l=7 f=0,0,142.2
6075           l=7 f=0,0,71.1
25             l=7 f=0,-25.6,0
25   75   50   l=7 f=0,-12.7,0
1575 4575 3000 l=7 f=0,-18,0
6025           l=7 f=0,220,0
6025 6075 50   l=7 f=0,109,0
C  P loads
25   6025 500  l=8 f=0,0,-6
```

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14                  :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                      :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288    \
   as=9.29,9.9 z=93,58.4 t=12,14                     :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14                :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62               :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                     :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154  \
   as=15.8,16 z=169,52.5 t=10.13,14                  :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
```

Truss T3 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7363	W14X74									COMPACT
		(C)	.606	.335	.000	.272	.00	1	(H1-1)	
7364	W14X74									COMPACT
		(C)	.630	.437	.000	.194	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	1.029	.611	.000	.419	.00	2	(H1-1)	
7367	W14X74									COMPACT
		(C)	1.420	.796	.000	.624	240.00	1	(H1-1)	
		(T)	.896	.713	.000	.184	240.00	2	(H2-1)	
7368	W14X74									COMPACT
		(C)	1.420	.796	.000	.624	.00	1	(H1-1)	
		(T)	.896	.713	.000	.184	.00	2	(H2-1)	
7370	G									NON-COM
		(C)	1.029	.611	.000	.419	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.630	.437	.000	.194	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	1.674	.856	.000	.818	240.00	3	(H1-1)	
7373	G									NON-COM
		(T)	.579	.457	.000	.122	240.00	4	(H2-1)	
7376	W14X90									COMPACT
		(T)	.611	.599	.000	.012	.00	3	(H2-1)	
7379	W14X145									COMPACT
		(C)	1.215	1.047	.000	.168	.00	3	(H1-1)	
7380	W14X145									COMPACT
		(C)	.812	.614	.000	.198	192.00	3	(H1-1)	
		(T)	.528	.436	.000	.092	192.00	2	(H2-1)	
7382	W14X61									COMPACT
		(C)	.624	.447	.000	.177	200.00	1	(H1-1)	
		(T)	.898	.674	.000	.224	200.00	2	(H2-1)	
7383	W14X43									COMPACT
		(T)	.576	.506	.000	.071	.00	2	(H2-1)	
7384	W14X43									NON-COM
		(T)	.780	.627	.000	.153	.00	2	(H2-1)	
7385	W14X61									COMPACT
		(C)	.945	.620	.000	.326	200.00	1	(H1-1)	
		(T)	1.162	.844	.000	.318	200.00	2	(H2-1)	
7386	W33X201									NON-COM
		(C)	.568	.568	.000	.000	.00	1	(H1-1)	
		(T)	.580	.580	.000	.000	.00	2	(H2-1)	
7387	W14X61									COMPACT
		(C)	.945	.620	.000	.326	200.00	1	(H1-1)	
		(T)	1.162	.844	.000	.318	200.00	2	(H2-1)	
7388	W14X43									NON-COM
		(T)	.780	.627	.000	.153	.00	2	(H2-1)	
7389	W14X43									COMPACT
		(T)	.576	.506	.000	.071	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.624	.447	.000	.177	200.00	1	(H1-1)	
		(T)	.898	.674	.000	.224	200.00	2	(H2-1)	

Truss T3 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7391	W14X145									COMPACT
		(C)	.550	.531	.000	.019	192.00	1	(H1-1)	
7392	W14X145									COMPACT
		(C)	.683	.578	.000	.105	192.00	1	(H1-1)	
		(T)	.528	.436	.000	.092	192.00	2	(H2-1)	
7394	W14X90									COMPACT
		(C)	.966	.853	.000	.113	192.00	3	(H1-1)	
7397	W33X201									NON-COM
		(C)	.712	.712	.000	.000	384.00	1	(H1-1)	
		(T)	.545	.545	.000	.000	384.00	2	(H2-1)	
7398	G									NON-COM
		(T)	.769	.705	.000	.064	153.67	3	(H2-1)	
7399	G									NON-COM
		(T)	.776	.707	.000	.069	.00	3	(H2-1)	
7400	G									NON-COM
		(T)	.658	.628	.000	.030	153.67	3	(H2-1)	
7401	G									NON-COM
		(T)	.663	.630	.000	.033	153.67	3	(H2-1)	
7405	G									NON-COM
		(C)	.977	.906	.000	.070	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	1.121	.911	.000	.210	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	1.057	.983	.000	.074	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	1.144	.987	.000	.157	153.67	3	(H1-1)	
7411	W14X74			fa > Fe						COMPACT
7412	W14X43			fa > Fe						NON-COM
7415	G									NON-COM
		(C)	.600	.588	.000	.013	.00	3	(H1-1)	
7416	G									NON-COM
		(C)	.604	.593	.000	.011	78.10	3	(H1-1)	
7417	W14X43			fa > Fe						NON-COM
7418	W14X74			fa > Fe						COMPACT
7419	W14X74			fa > Fe						COMPACT
7420	W14X43			fa > Fe						NON-COM
7425	W14X43			fa > Fe						NON-COM
7426	W14X74			fa > Fe						COMPACT
7431	G									NON-COM
		(T)	.696	.634	.000	.061	153.67	4	(H2-1)	
7432	G									NON-COM
		(T)	.714	.637	.000	.076	.00	4	(H2-1)	
7433	G									NON-COM
		(C)	.930	.846	.000	.084	.00	3	(H1-1)	
7434	G									NON-COM
		(C)	.961	.849	.000	.111	153.67	3	(H1-1)	
7435	G									NON-COM
		(T)	.575	.518	.000	.057	153.67	4	(H2-1)	
7436	G									NON-COM
		(T)	.588	.514	.000	.073	.00	3	(H2-1)	

Truss T3 Hangars 43 and 47 Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7437	G									NON-COM
		(C)	.884	.814	.000	.070	38.42	3	(H1-1)	
7438	G									NON-COM
		(C)	.989	.818	.000	.171	153.67	3	(H1-1)	

Truss T3 Hangars 43 and 47 Stepped Wind Loading

c **SAP90 INPUT**

```
system
L=8
C
C
C
joints
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333   E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
13 sh=214x3x5/16-3        w=.0012
```

```
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
7375 6482 6483 m=41 lp=1,0
7376 6470 6472 m=34 lp=2,0
7377 6472   25 m=34 lp=2,0
```

7378	25	75	m=34	lp=2,0
7379	6471	6473	m=35	lp=2,0
7380	6473	525	m=35	lp=2,0
7381	525	575	m=35	lp=2,0
7382	1025	1075	m=42	lp=2,0
7383	1525	1575	m=39	lp=2,0
7384	2025	2075	m=39	lp=2,0
7385	2525	2575	m=42	lp=2,0
7386	3025	3075	m=36	lp=2,0
7387	3525	3575	m=42	lp=2,0
7388	4025	4075	m=39	lp=2,0
7389	4525	4575	m=39	lp=2,0
7390	5025	5075	m=42	lp=2,0
7391	6480	6482	m=35	lp=2,0
7392	6482	5525	m=35	lp=2,0
7393	5525	5575	m=35	lp=2,0
7394	6481	6483	m=34	lp=2,0
7395	6483	6025	m=34	lp=2,0
7396	6025	6075	m=34	lp=2,0
7397	6478	3025	m=36	lp=2,0
7398	6470	6474	m=37	lp=2,0
7399	6474	6473	m=37	lp=2,0
7400	6472	6475	m=37	lp=2,0
7401	6475	525	m=37	lp=2,0
7402	25	6476	m=37	lp=2,0
7403	6476	575	m=37	lp=2,0
7405	6472	6474	m=37	lp=2,0
7406	6474	6471	m=37	lp=2,0
7407	25	6475	m=37	lp=2,0
7408	6475	6473	m=37	lp=2,0
7409	75	6476	m=37	lp=2,0
7410	6476	525	m=37	lp=2,0
7411	575	1025	m=38	lp=2,0
7412	1075	1525	m=39	lp=2,0
7413	1525	6477	m=40	lp=2,0
7414	6477	2075	m=40	lp=2,0
7415	1575	6477	m=40	lp=2,0
7416	6477	2025	m=40	lp=2,0
7417	2025	2575	m=39	lp=2,0
7418	2525	3075	m=38	lp=2,0
7419	3075	3525	m=38	lp=2,0
7420	3575	4025	m=39	lp=2,0
7421	4025	6479	m=40	lp=2,0
7422	6479	4575	m=40	lp=2,0
7423	4075	6479	m=40	lp=2,0
7424	6479	4525	m=40	lp=2,0
7425	4525	5075	m=39	lp=2,0
7426	5025	5575	m=38	lp=2,0
7427	5525	6486	m=37	lp=2,0
7428	6486	6075	m=37	lp=2,0
7429	5575	6486	m=37	lp=2,0
7430	6486	6025	m=37	lp=2,0
7431	6482	6485	m=37	lp=2,0
7432	6485	6025	m=37	lp=2,0
7433	5525	6485	m=37	lp=2,0
7434	6485	6483	m=37	lp=2,0
7435	6480	6484	m=37	lp=2,0

```
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0

loads
C Dead
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-4.6
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,3.925
575  5575 500  l=4 f=0,0,7.85
C Wind II
75   6075 6000 l=5 f=0,0,108
575  5575 500  l=5 f=0,0,216
C Wind III
75             l=6 f=0,0,46.4
575            l=6 f=0,0,92.8
1075           l=6 f=0,0,59.2
1575           l=6 f=0,0,25.6
2075           l=6 f=0,0,8
2575 5575 500  l=6 f=0,0,-9.6
6075           l=6 f=0,0,-4.8
25             l=6 f=0,149,0
25   75   50   l=6 f=0,82,0
1575           l=6 f=0,103,0
4575           l=6 f=0,111,0
6025           l=6 f=0,41,0
6025 6075 50   l=6 f=0,10.5,0
C Wind IV
75             l=7 f=0,0,153.6
575            l=7 f=0,0,307.2
1075           l=7 f=0,0,275.2
1575           l=7 f=0,0,243.2
2075           l=7 f=0,0,225.6
2575 5575 500  l=7 f=0,0,208
6075           l=7 f=0,0,104
25             l=7 f=0,25.6,0
25   75   50   l=7 f=0,21.6,0
4575           l=7 f=0,18,0
6025           l=7 f=0,220,0
6025 6075 50   l=7 f=0,109,0
```

```
C  P loads
25   6025 500  1=8 f=0,0,-3
```

Truss T3 Hangars 43 and 47 **Stepped Wind Loading**

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14             :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                 :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14           :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62          :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154   \
   as=15.8,16 z=169,52.5 t=10.13,14             :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
```

T3-47 All Conditions .5 Minimum

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7351	W14X90									COMPACT
		(T)	.718	.480	.000	.238	.00	4	(H2-1)	
7352	G									NON-COM
		(T)	.764	.552	.000	.212	240.00	4	(H2-1)	
7353	G									NON-COM
		(T)	.667	.487	.000	.180	.00	4	(H2-1)	
7354	G									NON-COM
		(T)	.687	.480	.000	.207	.00	4	(H2-1)	
7355	W14X90									COMPACT
		(T)	.625	.212	.000	.413	240.00	4	(H2-1)	
7356	W14X90									COMPACT
		(T)	.591	.200	.000	.391	.00	4	(H2-1)	
7357	G									NON-COM
		(T)	.666	.465	.000	.201	240.00	4	(H2-1)	
7358	G									NON-COM
		(T)	.645	.485	.000	.160	240.00	4	(H2-1)	
7359	G									NON-COM
		(T)	.713	.534	.000	.179	.00	4	(H2-1)	
7360	W14X90									COMPACT
		(T)	.739	.556	.000	.183	.00	4	(H2-1)	
7363	W14X74									COMPACT
		(T)	1.065	.717	.000	.349	.00	4	(H2-1)	
7364	W14X74									COMPACT
		(C)	.839	.563	.000	.276	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	1.575	.776	.000	.799	.00	2	(H1-1)	
7367	W14X74									COMPACT
		(C)	.908	.553	.000	.355	240.00	3	(H1-1)	
		(T)	1.303	1.072	.000	.232	240.00	4	(H2-1)	
7368	W14X74									COMPACT
		(C)	.740	.547	.000	.193	.00	3	(H1-1)	
		(T)	1.367	1.075	.000	.292	.00	4	(H2-1)	
7370	G									NON-COM
		(C)	1.575	.776	.000	.799	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.839	.563	.000	.276	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	1.610	.831	.000	.780	240.00	3	(H1-1)	
		(T)	.597	.374	.000	.223	240.00	2	(H2-1)	
7373	G									NON-COM
		(T)	.528	.495	.000	.033	240.00	4	(H2-1)	
7376	W14X90									COMPACT
		(T)	.750	.702	.000	.048	192.00	3	(H2-1)	
7379	W14X145									COMPACT
		(C)	.523	.491	.000	.031	192.00	3	(H1-1)	
		(T)	.540	.533	.000	.007	192.00	2	(H2-1)	
7380	W14X145									COMPACT
		(T)	.864	.657	.000	.207	192.00	4	(H2-1)	
7381	W14X145									COMPACT
		(T)	.840	.721	.000	.119	200.00	4	(H2-1)	

T3-47 All Conditions .5 Minimum

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7382	W14X61									COMPACT
		(T)	1.318	.965	.000	.353	200.00	4	(H2-1)	
7383	W14X43									COMPACT
		(T)	.678	.576	.000	.102	.00	4	(H2-1)	
7384	W14X43									COMPACT
		(T)	.903	.690	.000	.213	.00	4	(H2-1)	
7385	W14X61									COMPACT
		(C)	.605	.437	.000	.169	200.00	3	(H1-1)	
		(T)	1.424	.994	.000	.431	200.00	4	(H2-1)	
7386	W33X201									NON-COM
		(T)	.769	.714	.000	.054	.00	4	(H2-1)	
7387	W14X61									COMPACT
		(C)	.521	.380	.000	.141	200.00	3	(H1-1)	
		(T)	1.406	.982	.000	.423	200.00	4	(H2-1)	
7388	W14X43									COMPACT
		(T)	.869	.657	.000	.213	.00	4	(H2-1)	
7389	W14X43									COMPACT
		(T)	.593	.509	.000	.084	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.693	.488	.000	.205	200.00	3	(H1-1)	
		(T)	1.031	.759	.000	.271	200.00	2	(H2-1)	
7391	W14X145									COMPACT
		(T)	.890	.868	.000	.022	192.00	4	(H2-1)	
7392	W14X145									COMPACT
		(T)	.680	.567	.000	.114	192.00	2	(H2-1)	
7393	W14X145									COMPACT
		(T)	.632	.543	.000	.089	200.00	2	(H2-1)	
7394	W14X90									COMPACT
		(C)	.799	.731	.000	.067	192.00	4	(H1-1)	
7395	W14X90									COMPACT
		(C)	.561	.426	.000	.136	.00	4	(H1-1)	
7397	W33X201									NON-COM
		(C)	.558	.431	.000	.127	384.00	3	(H1-1)	
		(T)	.775	.704	.000	.071	384.00	4	(H2-1)	
7398	G									NON-COM
		(T)	.845	.788	.000	.056	153.67	3	(H2-1)	
7399	G									NON-COM
		(T)	.853	.790	.000	.063	153.67	3	(H2-1)	
7400	G									NON-COM
		(T)	.770	.704	.000	.066	153.67	4	(H2-1)	
7401	G									NON-COM
		(T)	.751	.707	.000	.044	.00	4	(H2-1)	
7405	G									NON-COM
		(C)	1.009	.918	.000	.091	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	1.104	.922	.000	.182	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	1.063	.995	.000	.068	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	1.177	.999	.000	.178	153.67	3	(H1-1)	

T3-47 All Conditions .5 Minimum

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7411	W14X74		fa > Fe							COMPACT
7412	W14X43		fa > Fe							NON-COM
7415	G									NON-COM
		(T)	.682	.662	.000	.019	.00	4	(H2-1)	
7416	G									NON-COM
		(T)	.675	.660	.000	.015	156.20	4	(H2-1)	
7417	W14X43		fa > Fe							NON-COM
7418	W14X74		fa > Fe							COMPACT
7419	W14X74		fa > Fe							COMPACT
7420	W14X43		fa > Fe							NON-COM
7421	G									NON-COM
		(T)	.739	.725	.000	.014	.00	4	(H2-1)	
7422	G									NON-COM
		(T)	.743	.728	.000	.016	156.20	4	(H2-1)	
7425	W14X43		fa > Fe							NON-COM
7426	W14X74		fa > Fe							COMPACT
7431	G									NON-COM
		(T)	.857	.778	.000	.079	153.67	4	(H2-1)	
7432	G									NON-COM
		(T)	.864	.781	.000	.083	.00	4	(H2-1)	
7433	G									NON-COM
		(C)	.955	.875	.000	.080	.00	3	(H1-1)	
7434	G									NON-COM
		(C)	1.036	.878	.000	.157	153.67	3	(H1-1)	
7435	G									NON-COM
		(T)	.720	.647	.000	.073	153.67	4	(H2-1)	
7436	G									NON-COM
		(T)	.716	.649	.000	.068	153.67	4	(H2-1)	
7437	G									NON-COM
		(C)	.946	.853	.000	.092	38.42	3	(H1-1)	
7438	G									NON-COM
		(C)	1.024	.857	.000	.167	153.67	3	(H1-1)	

CHECK SINGLE ANGLE 5X3X 5/16

(Member 11, SF-44)

REACTION PER ONE ANGLE:

FORCES:		MOMENTS
$Px := 0 \cdot lb$		$Mx := 1025 \cdot lb \cdot in$
$Py := 115 \cdot lb$		$My := 0 \cdot lb \cdot in$
$Pz := 53600 \cdot lb$	"Tension"	$Mz := 0 \cdot lb \cdot in$

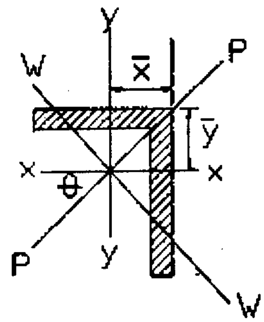
AT: $\theta := 0.112 \cdot \pi$

$Mpp := \left| Mx + My \right| \cdot \cos(\theta)$

$Mpp = 962 \cdot lb \cdot in$

$Mww := \left| My - Mx \right| \cdot \sin(\theta)$

$Mww = 353 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE:	$A := 2.402 \cdot in^2$
THICKNESS OF THE ANGLE:	$t := \frac{5}{16} \cdot in$
LENGTH OF LEGS:	$Lx := 3 \cdot in$
	$Ly := 5 \cdot in$
LENGTH OF THE MEMBER:	$l := 293 \cdot in$
	$Y := 1.68 \cdot in$
	$X := 0.681 \cdot in$
MOMENT OF INERTIA:	$Ixx := 6.263 \cdot in^4$
	$Iyy := 1.747 \cdot in^4$
	$Iww := 1.041 \cdot in^4$
	$Ipp := 6.969 \cdot in^4$
RADIUS OF GYRATION:	$rx := 1.61 \cdot in$
	$ry := 0.853$
	$rw := \sqrt{\frac{Iww}{A}}$ $rw = 0.658 \cdot in$
	$rp := \sqrt{\frac{Ipp}{A}}$ $rp = 1.703 \cdot in$
MODULUS OF ELASTICITY	$E := 29000000 \cdot lb \cdot in^{-2}$
STEEL YIELD STRESS:	$Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

$$fa := \frac{Pz}{0.85 \cdot A} \qquad fa = 26253 \cdot lb \cdot in^{-2}$$

B. ACTUAL BENDING STRESSES:

$$fbp := \frac{Lx \cdot Mpp \cdot \sin(\theta)}{Ipp}$$

$$fbp = 143 \cdot lb \cdot in^{-2}$$

$$fbw := \frac{Mww \cdot \left(X^2 + Y^2\right)^{0.5}}{Iww}$$

$$fbw = 615 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

$$k := 0.65$$

FOR SLENDERNESS RATIO: $\frac{k \cdot L}{ry} = 223 \cdot in \quad < \quad 300$

$$Fa\_t := Fy \qquad Fa\_t = 36000 \cdot lb \cdot in^{-2}$$

C.2. ALLOWABLE BENDING STRESSES:

$$Fbp := Fy \qquad Fbp = 36000 \cdot lb \cdot in^{-2}$$

$$Fbw := Fy \qquad Fbw = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL TENSION AND BENDING ARE:

$$\frac{fa}{Fa\_t} + \frac{fbp}{Fbp} + \frac{fbw}{Fbw} = 0.75 \qquad < 1.0 \text{ ok}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{3^{0.5}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

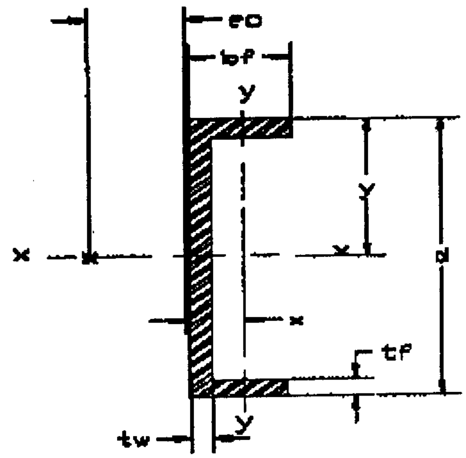
$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 123 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: **THIS ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE DID NOT FORM.**

CHECK CHANNEL C 10 X 20

(Truss SF II, MEMBERS 7580)



REACTIONS:

FORCES:

$Px := 205 \cdot lb$

$Py := 0 \cdot lb$

$Pz := 69900 \cdot lb$

MOMENTS:

$Mx := 0 \cdot lb \cdot in$

$My := 4500 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$

SECTION PROPERIES:

X-SECTION AREA: $A := 5.88 \cdot in^2$

FLANGE AND WEB DIM.: $tw := 0.379 \cdot in$

$tf := 0.436 \cdot in$

$d := 10 \cdot in$

$bf := 2.09 \cdot in$

LENGTH OF THE MEMBER: $l := 120 \cdot in$

RADIUS OF GYRATION: $rx := 3.66 \cdot in$

$ry := 0.692 \cdot in$

SECTION MODULUS: $Sx := 15.8 \cdot in^3$

$Sy := 1.32 \cdot in^3$

MOMENT OF INERTIA: $Ixx := 78.9 \cdot in^4$

$Iyy := 2.81 \cdot in^4$

CENTROID DISTANCE: $Y := 5 \cdot in$

$X := 0.606 \cdot in$

SHEAR CENTER LOCATION: $eo := 0.637 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

SHEAR MODULUS: $G := 11200000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 1.0$

$$fa := \frac{Pz}{A} \qquad fa = 11888 \cdot lb \cdot in^{-2}$$

B. ACTUAL BENDING STRESSES:

$$fbx := \frac{Mx \cdot Y}{Ixx} \qquad fbx = 0 \cdot lb \cdot in^{-2}$$

$$fby := \frac{My \cdot (eo + X)}{Iyy} \qquad fby = 1991 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 33$

Note that this beam is restrained in the y-direction, Thus, rx is used

Column slenderness ratio distinguishing elastic and inelastic buckling:

$$Cc := \left(\frac{2 \cdot \pi^2 \cdot E}{Fy}\right)^{0.5} \qquad Cc = 126$$

IN COPMRESSION:

$$Fa1\_c := \left[1 - \frac{\left(\frac{k \cdot l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa1\_c = 34783 \cdot lb \cdot in^{-2}$$

or

$$Fa2\_c := \frac{\pi \cdot E}{\left[\left(\frac{k \cdot l}{rx}\right)^2\right]} \qquad Fa2\_c = 84752 \cdot lb \cdot in^{-2}$$

PER AISC, SECTION E2, Fa2_c IS ONLY APPLICABLE FOR kl/r > Cc, THEREFORE:

$$Fa\_c := Fa1\_c \qquad Fa\_c = 34783 \cdot lb \cdot in^{-2}$$

IN TENSION:

$$Fa\_t := Fy$$

$$Fa\_t = 36000 \cdot lb \cdot in^{-2}$$

GOVERNING AXIAL STRESSES:

$$Fa := \min\left(\begin{bmatrix} Fa\_c \\ Fa\_t \end{bmatrix}\right)$$

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES PER AISC, H1-3:

FOR $\frac{fa}{Fa} = 0.342$ > 0.15

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.606 \qquad < \qquad 1.0 \qquad OK$$

2. CHECK SHEAR STRESSES:

A. ALLOWABLE SHEAR STRESS:

$$Fv := \frac{Fy}{3^{0.5}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{2 \cdot tf \cdot bf \cdot Y} + \frac{Px}{2 \cdot tf \cdot bf} \qquad fvx = 112 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{(eo + Y) \cdot d \cdot tw} + \frac{Py}{d \cdot tw} \qquad fvy = 0 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THESE CHANNEL FOR THE REACTIONS ABOVE DO NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, PLASTIC HINGES DO NOT FORM.

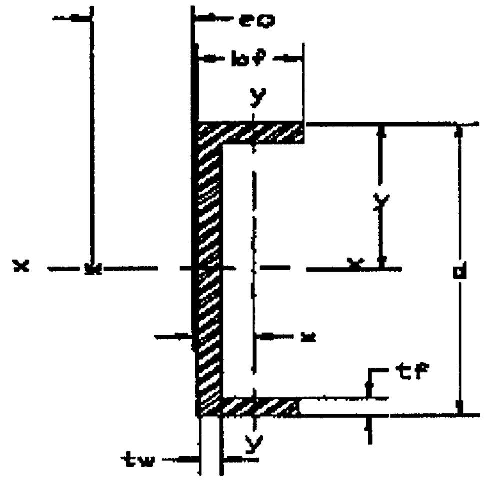
CHECK CHANNEL C 10 X 15.3

(Truss SF II, MEMBERS 7661)

REACTIONS:

FORCES: $Px := 200 \cdot lb$; $Py := 0 \cdot lb$; $Pz := 56700 \cdot lb$

MOMENTS: $Mx := 0 \cdot lb \cdot in$; $My := 3890 \cdot lb \cdot in$; $Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

X-SECTION AREA: $A := 4.49 \cdot in^2$

FLANGE AND WEB DIM.: $tw := 0.24 \cdot in$

$tf := 0.436 \cdot in$

$d := 10 \cdot in$

$bf := 2.6 \cdot in$

LENGTH OF THE MEMBER: $l := 120 \cdot in$

RADIUS OF GYRATION: $rx := 3.87 \cdot in$

$ry := 0.713 \cdot in$

SECTION MODULUS: $Sx := 13.5 \cdot in^3$

$Sy := 1.16 \cdot in^3$

MOMENT OF INERTIA: $Ixx := 67.4 \cdot in^4$

$Iyy := 2.28 \cdot in^4$

CENTROID DISTANCE: $Y := 5 \cdot in$

$X := 0.634 \cdot in$

SHEAR CENTER LOCATION: $eo := 0.796 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

SHEAR MODULUS: $G := 11200000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 1.0$

$$fa := \frac{Pz}{A} \qquad fa = 12628 \cdot lb \cdot in^{-2}$$

B. ACTUAL BENDING STRESSES:

$$fbx := \frac{Mx \cdot Y}{Ixx} \qquad fbx = 0 \cdot lb \cdot in^{-2}$$

$$fby := \frac{My \cdot (eo + X)}{Iyy} \qquad fby = 2440 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALLOWABLE AXIAL STRESS (Fa):

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 31$

Note that this beam is restrained in the y-direction, Thus, rx is used

Column slenderness ratio distinguishing elastic and inelastic buckling: $Cc := \left(\frac{2 \cdot \pi^2 \cdot E}{Fy}\right)^{0.5}$ $\qquad Cc = 126$

IN COPMRESSION: $$Fa1\_c := \left[1 - \frac{\left(\frac{k \cdot l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa1\_c = 34912 \cdot lb \cdot in^{-2}$$

or $$Fa2\_c := \frac{\pi \cdot E}{\left[\left(\frac{k \cdot l}{rx}\right)^2\right]} \qquad Fa2\_c = 94756 \cdot lb \cdot in^{-2}$$

PER AISC, SECTION E2, Fa2_c IS ONLY APPLICABLE FOR kl/r > Cc, THEREFORE:

$$Fa\_c := Fa1\_c \qquad Fa\_c = 34912 \cdot lb \cdot in^{-2}$$

IN TENSION: $Fa\_t := Fy$

$$Fa\_t = 36000 \cdot lb \cdot in^{-2}$$

GOVERNING AXIAL STRESSES: $Fa := \min\left(\begin{bmatrix} Fa\_c \\ Fa\_t \end{bmatrix}\right)$

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES PER AISC, H1-3:

FOR $\frac{fa}{Fa} = 0.362$ $\qquad$ > 0.15

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.652 \qquad < \quad 1.0 \qquad \text{OK}$$

2. CHECK SHEAR STRESSES:

A. ALLOWABLE SHEAR STRESS:

$$Fv := \frac{Fy}{3^{0.5}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{2 \cdot tf \cdot bf \cdot Y} + \frac{Px}{2 \cdot tf \cdot bf} \qquad fvx = 88 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{(eo + Y) \cdot d \cdot tw} + \frac{Py}{d \cdot tw} \qquad fvy = 0 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THESE CHANNEL FOR THE REACTIONS ABOVE DO NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, PLASTIC HINGES DO NOT FORM.

CHECK BEAM W 14X8
(Member 7412)

REACTION:

FORCES:

$Px := 512 \cdot lb$

$Py := 0 \cdot lb$

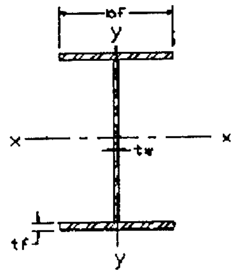
$Pz := 217300 \cdot lb$

MOMENTS:

$Mx := 0 \cdot lb \cdot in$

$My := 44500 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

X-SECTION AREA: $A := 12.6 \cdot in^2$

FLANGE AND WEB DIM.: $tw := 0.305 \cdot in$
$tf := 0.53 \cdot in$
$d := 13.66 \cdot in$
$bf := 8 \cdot in$

LENGTH OF THE MEMBER: $l := 312.4 \cdot in$

RADIUS OF GYRATION: $rx := 5.82 \cdot in$
$ry := 1.89 \cdot in$

SECTION MODULUS: $Sx := 62.7 \cdot in^3$
$Sy := 11.3 \cdot in^3$

MOMENT OF INERTIA: $Ixx := 428 \cdot in^4$
$Iyy := 45.2 \cdot in^4$

CENTROID DISTANCE: $Y := 0.5 \cdot d$ $\quad Y = 6.83 \cdot ft$
$X := 0.5 \cdot bf$ $\quad X = 4 \cdot ft$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

SHEAR MODULUS: $G := 11200000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$$fa := \frac{Pz}{A}$$

$$fa = 17246 \cdot lb \cdot ft^{-2}$$

B. ACTUAL BENDING STRESSES:

$$fbx := \frac{Mx \cdot Y}{Ixx} \qquad fbx = 0 \cdot lb \cdot ft^{-2}$$

$$fby := \frac{My \cdot (X)}{Iyy} \qquad fby = 3938 \cdot lb \cdot ft^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{ry} = 107$

Column slenderness ratio distinguishing elastic and inelastic buckling: $Cc := \left(\frac{2 \cdot \pi^2 \cdot E}{Fy}\right)^{0.5} \qquad Cc = 126$

IN COPMRESSION: $$Fa := \left[1 - \frac{\left(\frac{k \cdot l}{ry}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy$$

$$Fa = 22933 \cdot lb \cdot ft^{-2}$$

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot ft^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot ft^{-2}$$

C.3. COMBINED STRESSES PER AISC, H1-3:

FOR $\frac{fa}{Fa} = 0.752$ $\qquad > 0.15$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.908 \qquad < \quad 1.00 \qquad \text{"OK"}$$

2. CHECK SHEAR STRESSES:

Factor of safety included in the shear stress allowable:

$$FSv := 3^{0.5}$$

A. ALLOWABLE SHEAR STRESS:

$$Fv := 0.4 \cdot FSv \cdot Fy \qquad Fv = 24942 \cdot lb \cdot ft^{-2}$$

B. ACTUAL SHAER STRESSES:

$$fvx := \frac{Mz}{2 \cdot tf \cdot bf \cdot Y} + \frac{Px}{2 \cdot tf \cdot bf} \qquad fvx = 60 \cdot lb \cdot ft^{-2} \qquad < \qquad Fv = 24942 \cdot lb \cdot ft^{-2}$$

$$fvy := \frac{Py}{d \cdot tw} \qquad fvy = 0 \cdot lb \cdot ft^{-2} \qquad < \qquad Fv = 24942 \cdot lb \cdot ft^{-2}$$

CONCLUSION: THIS BEAM FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK BEAM W14X74

(Member 7411, T3-47)

REACTION:

FORCES:

$Px := 922 \cdot lb$

$Py := 0 \cdot lb$

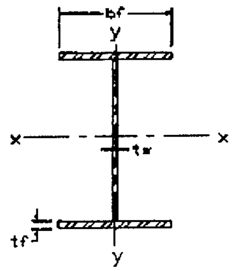
$Pz := 557500 \cdot lb$

MOMENTS:

$Mx := 0 \cdot lb \cdot in$

$My := 45200 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

X-SECTION AREA:	$A := 24.1 \cdot in^2$
FLANGE AND WEB DIM.:	$tw := 0.51 \cdot in$ $tf := 0.855 \cdot in$ $d := 14.31 \cdot in$ $bf := 10.13 \cdot in$
LENGTH OF THE MEMBER:	$l := 312.4 \cdot in$
RADIUS OF GYRATION:	$rx := 6.05 \cdot in$ $ry := 2.48 \cdot in$
SECTION MODULUS:	$Sx := 123 \cdot in^3$ $Sy := 29.3 \cdot in^3$
MOMENT OF INERTIA:	$Ixx := 882 \cdot in^4$ $Iyy := 148 \cdot in^4$
CENTROID DISTANCE:	$Y := 0.5 \cdot d$ $\quad Y = 7.15 \cdot in$ $X := 0.5 \cdot bf$ $\quad X = 5.06 \cdot in$
MODULUS OF ELASTICITY	$E := 29000000 \cdot lb \cdot in^{-2}$
SHEAR MODULUS:	$G := 11200000 \cdot lb \cdot in^{-2}$
STEEL YIELD STRESS:	$Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$$fa := \frac{Pz}{A}$$

$$fa = 23133 \cdot lb \cdot in^{-2}$$

B. ACTUAL BENDING STRESSES:

$$fbx := \frac{Mx \cdot Y}{Ixx} \qquad fbx = 0 \cdot lb \cdot in^{-2}$$

$$fby := \frac{My \cdot (X)}{Iyy} \qquad fby = 1547 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{ry} = 82$

Column slenderness ratio distinguishing elastic and inelastic buckling:

$$Cc := \left(\frac{2 \cdot \pi^2 \cdot E}{Fy}\right)^{0.5} \qquad Cc = 126$$

IN COPMRESSION:

$$Fa := \left[1 - \frac{\left(\frac{k \cdot l}{ry}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy$$

$$Fa = 28411 \cdot lb \cdot in^{-2}$$

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES PER AISC, H1-3:

FOR $\frac{fa}{Fa} = 0.814 \qquad > 0.15$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 1.114 \qquad > 1.00 \qquad \text{"NG"}$$

2. CHECK SHEAR STRESSES:

Factor of safety included in the shear stress allowable:

$$FSv := 3^{0.5}$$

A. ALLOWABLE SHEAR STRESS:

$$Fv := 0.4 \cdot FSv \cdot Fy \qquad Fv = 24942 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHAER STRESSES:

$$fvx := \frac{Mz}{2 \cdot tf \cdot bf \cdot Y} + \frac{Px}{2 \cdot tf \cdot bf} \qquad fvx = 53 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 24942 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Py}{d \cdot tw} \qquad fvy = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 24942 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS BEAM FOR THE REACTIONS ABOVE, EXCEEDED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE SHALL FORM.

CHECK DOUBLE ANGLE 3X 2.5 X 5/16

(Member 215, T2-47)

REACTION:

FORCES:

$Px := 0 \cdot lb$

$Py := 23.5 \cdot (2) \cdot lb$

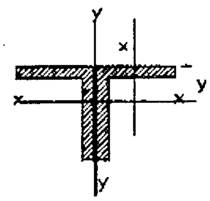
$Pz := 13950 \cdot (2) \cdot lb$

MOMENTS

$Mx := 1025 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE: $A := 1.62 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 2.5 \cdot in$

$Ly := 3 \cdot in$

LENGTH OF THE MEMBER: $l := 152 \cdot in$

$Y := 0.933 \cdot in$

$X := 0.683 \cdot in$

MOMENT OF INERTIA: $Ixx := 1.42 \cdot (2) \cdot in^4$

$Iyy := 0.898 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 3.307 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 0.936 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 1.01 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 8611 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 1492 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. **ALLOWABLE AXIAL AND BENDING STRESSES:**

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. **ALOWABLE AXIAL STRESS (Fa):**

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.1254$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 6.51$$

$$Q := \begin{vmatrix} Q3 \ \text{ if } \ \frac{b}{t} \geq \frac{155}{\sqrt{36}} \\ Q1 \ \text{ if } \ \frac{b}{t} \leq \frac{76}{\sqrt{36}} \\ Q2 \end{vmatrix}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 8$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{kl}{rx} = 106$ < $Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 23394 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. **ALLOWABLE BENDING STRESSES:**

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 0.368 \qquad > 0.15$$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.44 \qquad < 1.0 \text{ OK}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 60 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK DOUBLE ANGLE 3.5X 2.5 X 5/16

(Member 705, T1-47)

REACTION:

FORCES:

$Px := 0 \cdot lb$

$Py := 44.5 \cdot (2) \cdot lb$

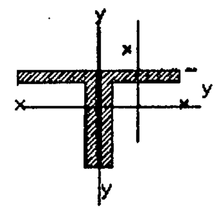
$Pz := 31560 \cdot (2) \cdot lb$

MOMENTS

$Mx := 2785 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE: $A := 1.777 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 2.5 \cdot in$

$Ly := 3.5 \cdot in$

LENGTH OF THE MEMBER: $l := 146 \cdot in$

$Y := 1.14 \cdot in$

$X := 0.637 \cdot in$

MOMENT OF INERTIA: $Ixx := 2.191 \cdot (2) \cdot in^4$

$Iy := 0.939 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 3.3201 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 1.11 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 0.967 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 17760 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 3000 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.1254$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 6.51$$

$$Q := \begin{vmatrix} Q3 \ \text{if} \ \frac{b}{t} \ge \frac{155}{\sqrt{36}} \\ Q1 \ \text{if} \ \frac{b}{t} \le \frac{76}{\sqrt{36}} \\ Q2 \end{vmatrix}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 8$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 85 \quad < \quad Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 27732 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 0.64 \qquad > 0.15$$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.906 \qquad < 1.0 \text{ OK}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 114 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK DOUBLE ANGLE 5X 3X 5/16

(Member 703, T1-47)

REACTION:

FORCES:

$Px := 0 \cdot lb$

$Py := 41.5 \cdot (2) \cdot lb$

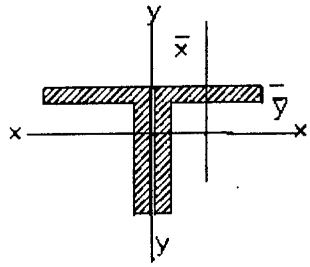
$Pz := 43850 \cdot (2) \cdot lb$

MOMENTS

$Mx := 2445 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE: $A := 2.402 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3 \cdot in$

$Ly := 5 \cdot in$

LENGTH OF THE MEMBER: $l := 145 \cdot in$

$Y := 1.68 \cdot in$

$X := 0.681 \cdot in$

MOMENT OF INERTIA: $Ixx := (2) \cdot 6.263 \cdot in^4$

$Iyy := 1.747 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 5.722 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 1.615 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 1.091 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 18256 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 1296 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.0825$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 4.521$$

$$Q := \begin{cases} Q3 & \text{if } \frac{b}{t} \geq \frac{155}{\sqrt{36}} \\ Q1 & \text{if } \frac{b}{t} \leq \frac{76}{\sqrt{36}} \\ Q2 & \end{cases}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 9.6$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{kl}{rx} = 58$ $<$ $Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 32143 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 0.568 \qquad > 0.15$$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.881 \qquad < 1.0 \text{ OK}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

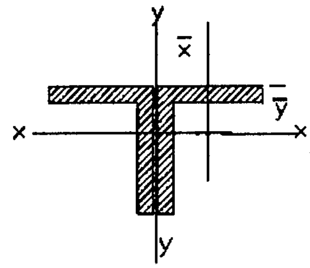
$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 89 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK DOUBLE ANGLE 5X 3.5 X 5/16

(Member 701, T1-47)

REACTION:



FORCES:

$Px := 0 \cdot lb$

$Py := 47.5 \cdot (2) \cdot lb$

$Pz := 61500 \cdot (2) \cdot lb$

MOMENTS

$Mx := 2890 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$

SECTION PROPERIES:

AREA OF THE ANGLE: $A := 2.559 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3.5 \cdot in$

$Ly := 5 \cdot in$

LENGTH OF THE MEMBER: $l := 144 \cdot in$

$Y := 1.59 \cdot in$

$X := 0.838 \cdot in$

MOMENT OF INERTIA: $Ixx := (2) \cdot 6.606 \cdot in^4$

$Iyy := 2.719 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 9.032 \cdot in^4$ "about y-y"

RADIUS OF GYRATION:

$rx := \sqrt{\frac{Ixx}{A}}$ $rx = 1.607 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 1.328 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. **CHECK AXIAL AND BENDING STRESSES:**

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 24033 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 1492 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALLOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.0396$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 3.322$$

$$Q := \begin{cases} Q3 & \text{if } \frac{b}{t} \ge \frac{155}{\sqrt{36}} \\ Q1 & \text{if } \frac{b}{t} \le \frac{76}{\sqrt{36}} \\ Q2 & \end{cases}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 112$$

$$Q := Q3$$

$$Q = 3.322$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 69$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{kl}{rx} = 58 \quad < \quad Cc = 69$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2} \right] \cdot Fy \qquad Fa = 77192 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 0.311 \qquad > 0.15$$

$$\frac{fa}{Fa} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.353 \qquad < 1.0 \text{ OK}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 87 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

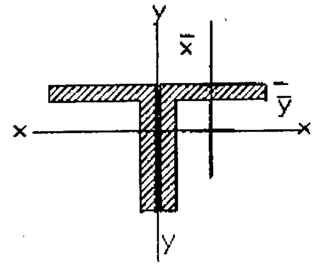
CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK DOUBLE ANGLE 4X 3X 5/16

(Member 719, T1-47)

REACTION:

FORCES:	MOMENTS
$Px := 0 \cdot lb$	$Mx := 5100 \cdot (2) \cdot lb \cdot in$
$Py := 64.5 \cdot (2) \cdot lb$	$My := 0 \cdot lb \cdot in$
$Pz := 61500 \cdot (2) \cdot lb$	$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE: $A := 2.09 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3 \cdot in$

$Ly := 4 \cdot in$

LENGTH OF THE MEMBER: $l := 154 \cdot in$

$Y := 1.26 \cdot in$

$X := 0.759 \cdot in$

MOMENT OF INERTIA: $Ixx := (2) \cdot 3.381 \cdot in^4$

$Iyy := 1.646 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 5.7 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 1.272 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 1.168 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 29426 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 4133 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALLOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.0825$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 4.521$$

$$Q := \begin{cases} Q3 & \text{if } \frac{b}{t} \geq \frac{155}{\sqrt{36}} \\ Q1 & \text{if } \frac{b}{t} \leq \frac{76}{\sqrt{36}} \\ Q2 & \end{cases}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 9.6$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 79 \quad < \quad Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 28988 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 1.015 \qquad > 0.15$$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 1.477 \qquad > 1.0 \text{ NG}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

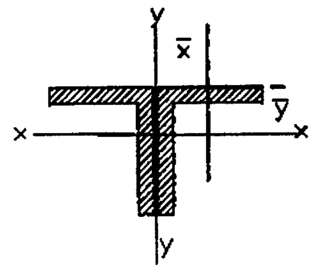
$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 138 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, EXCEEDED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL FORM.

CHECK DOUBLE ANGLE 3X 3.5 X 5/16

(Member 701, T1-47)

REACTION:



FORCES:	MOMENTS
$Px := 0 \cdot lb$	$Mx := 2880 \cdot (2) \cdot lb \cdot in$
$Py := 47.5 \cdot (2) \cdot lb$	$My := 0 \cdot lb \cdot in$
$Pz := 61000 \cdot (2) \cdot lb$	$Mz := 0 \cdot lb \cdot in$

SECTION PROPERIES:

AREA OF THE ANGLE: $A := 1.934 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3.5 \cdot in$

$Ly := 3 \cdot in$

LENGTH OF THE MEMBER: $l := 144 \cdot in$

$Y := 1.06 \cdot in$

$X := 0.808 \cdot in$

MOMENT OF INERTIA: $Ixx := (2) \cdot 2.33 \cdot in^4$

$Iyy := 1.583 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 5.691 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 1.098 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 1.213 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 31541 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 2398 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.0396$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 3.322$$

$$Q := \begin{array}{|l} Q3 \text{ if } \frac{b}{t} \geq \frac{155}{\sqrt{36}} \\ Q1 \text{ if } \frac{b}{t} \leq \frac{76}{\sqrt{36}} \\ Q2 \end{array}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 11.2$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 85$ < $Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 27768 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 1.136 \qquad \geq 0.15$$

EQUATION H1-1 CONTROLS AS THE BRACES ARE LOADED IN SINGLE CURVATURE WITH THE LARGEST MOMENTS AT THE CENTER THE BRACES AND THEY ARE UNRESTRAINED AGAINST ROTATION AT THEIR ENDS.

$$Cmp := 1.0 \qquad Cmw := 1.0$$

$$Fex := \frac{\pi^2 \cdot E}{\left[\left(\frac{k \cdot l}{rx}\right)^2\right]} \qquad Fex = 39359 \cdot lb \cdot in^{-2}$$

$$Fey := \frac{\pi^2 \cdot E}{\left[\left(\frac{k \cdot l}{ry}\right)^2\right]} \qquad Fey = 48069 \cdot lb \cdot in^{-2}$$

$$\frac{fa}{Fa} + \frac{Cmp \cdot fbx}{\left(1 - \frac{fa}{Fex}\right) \cdot Fbx} + \frac{Cmw \cdot fby}{\left(1 - \frac{fa}{Fey}\right) \cdot Fby} = 1.471 \qquad < 1.0 \text{ OK}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 87 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, EXCEEDED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL FORM.

CHECK DOUBLE ANGLE 3X 2X 5/16

(Member 715, T1-47)

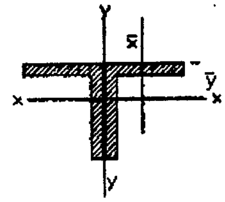
REACTION:

FORCES: **MOMENTS**

$Px := 0 \cdot lb$ $Mx := 2100 \cdot (2) \cdot lb \cdot in$

$Py := 33.5 \cdot (2) \cdot lb$ $My := 0 \cdot lb \cdot in$

$Pz := 37450 \cdot (2) \cdot lb$ $Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE: $A := 1.465 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 2 \cdot in$

$Ly := 3 \cdot in$

LENGTH OF THE MEMBER: $l := 152 \cdot in$

$Y := 1.02 \cdot in$

$X := 0.516 \cdot in$

MOMENT OF INERTIA: $Ixx := 1.317 \cdot (2) \cdot in^4$

$Iyy := 0.470 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 1.72 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 0.948 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 0.766 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 25563 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 3157 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALLOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.1684$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 10.173$$

$$Q := \begin{cases} Q3 & \text{if } \frac{b}{t} \ge \frac{155}{\sqrt{36}} \\ Q1 & \text{if } \frac{b}{t} \le \frac{76}{\sqrt{36}} \\ Q2 & \end{cases}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 6.4$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 104 \quad < \quad Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 23708 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 1.078 \qquad > 0.15$$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 1.271 \qquad > 1.0 \text{ NG}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 107 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, EXCEEDED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL FORM.

CHECK DOUBLE ANGLE 3X 3 X 5/16

(Member 703, T1-44)

REACTION:

FORCES:

$Px := 0 \cdot lb$

$Py := 41.5 \cdot (2) \cdot lb$

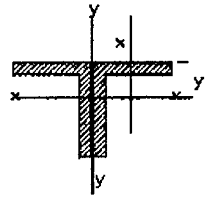
$Pz := 43600 \cdot (2) \cdot lb$

MOMENTS

$Mx := 2435 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



SECTION PROPERIES:

AREA OF THE ANGLE: $A := 1.777 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3 \cdot in$

$Ly := 3 \cdot in$

LENGTH OF THE MEMBER: $l := 145 \cdot in$

$Y := 0.865 \cdot in$

$X := 0.865 \cdot in$

MOMENT OF INERTIA: $Ixx := 1.51 \cdot (2) \cdot in^4$

$Iyy := 1.51 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $Iyy = 5.679 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $rx = 0.922 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $ry = 1.264 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $fa = 24536 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 3443 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.0825$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 4.521$$

$$Q := \begin{cases} Q3 & \text{if } \frac{b}{t} \geq \frac{155}{\sqrt{36}} \\ Q1 & \text{if } \frac{b}{t} \leq \frac{76}{\sqrt{36}} \\ Q2 & \end{cases}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 9.6$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 102 \quad < \quad Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 24166 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 1.015 \qquad > 0.15$$

$$\frac{fa}{Fa} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 1.111 \qquad > 1.0 \text{ NG}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 89 \cdot lb \cdot in^{-2} \qquad < \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, EXCEEDED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK DOUBLE ANGLE 6X3.5 X 5/16

(Member 23, SF-44)

REACTION PER TWO ANGLE:

FORCES:

$Px := 0 \cdot lb$

$Py := 69.5 \cdot (2) \cdot lb$

$Pz := 44550 \cdot (2) \cdot lb$ "Tension"

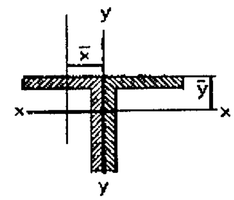
MOMENTS

$Mx := 3000 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$

SECTION PROPERIES:



AREA OF THE ANGLE: $A := 3.42 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3.5 \cdot in$

$Ly := 6 \cdot in$

LENGTH OF THE MEMBER: $l := 323 \cdot in$

$Y := 2.01 \cdot in$

$X := 0.763 \cdot in$

MOMENT OF INERTIA: $Ixx := (2) \cdot 10.9 \cdot in^4$

$Iyy := 2.85 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left(Iyy + \frac{A}{2} \cdot X^2 \right)$ "for two angles about y-y"

$Iyy = 9.682 \cdot in^4$

RADIUS OF GYRATION: $rx := 0.937 \cdot in$

$ry := 0.744$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa): $fa := \frac{Pz}{0.85 \cdot A}$ $fa = 15325 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $fbx = 1098 \cdot lb \cdot in^{-2}$

$fby := \frac{My \cdot Lx}{Iyy}$ $fby = 0 \cdot lb \cdot in^{-2}$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

$k := 0.65$

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{ry} = 282 \cdot in$ < 300

$Fa\_t := Fy$ $\qquad Fa\_t = 36000 \cdot lb \cdot in^{-2}$

C.2. ALLOWABLE BENDING STRESSES:

$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$

$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL TENSION AND BENDING ARE:

$$\frac{fa}{Fa\_t} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.456$$

< 1.0 OK

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

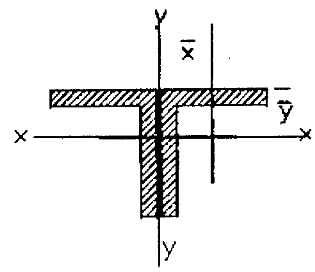
$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 127 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE DID NOT FORM.

CHECK DOUBLE ANGLE 5X 3X 5/16

(Member 703, T1-47)

REACTION:



FORCES:

$Px := 0 \cdot lb$

$Py := 41.5 \cdot (2) \cdot lb$

$Pz := 43850 \cdot (2) \cdot lb$

MOMENTS

$Mx := 2445 \cdot (2) \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$

SECTION PROPERIES:

AREA OF THE ANGLE: $A := 2.402 \cdot (2) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3 \cdot in$

$Ly := 5 \cdot in$

LENGTH OF THE MEMBER: $l := 145 \cdot in$

$Y := 1.68 \cdot in$

$X := 0.681 \cdot in$

MOMENT OF INERTIA: $Ixx := (2) \cdot 6.263 \cdot in^4$

$Iyy := 1.747 \cdot in^4$ "for one angle about its shear center"

$Iyy := 2 \cdot \left[(Iyy) + \frac{A}{2} \cdot X^2 \right]$ $\quad Iyy = 5.722 \cdot in^4$ "about y-y"

RADIUS OF GYRATION: $rx := \sqrt{\frac{Ixx}{A}}$ $\quad rx = 1.615 \cdot in$

$ry := \sqrt{\frac{Iyy}{A}}$ $\quad ry = 1.091 \cdot in$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$fa := \frac{Pz}{A}$ $\quad fa = 18256 \cdot lb \cdot in^{-2}$

B. ACTUAL BENDING STRESSES: $fbx := \frac{Mx \cdot (Ly - Y)}{Ixx}$ $\quad fbx = 1296 \cdot lb \cdot in^{-2}$

$$fby := \frac{My \cdot Lx}{Iyy} \qquad fby = 0 \cdot lb \cdot in^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:

NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

C.1. ALOWABLE AXIAL STRESS (Fa):

IN COMPRESSION: PER AISC, PAGE 5-310, SECTION 4:

FOR: $b := Lx$

$$Q1 := 1$$

$$Q2 := 1.34 - 0.00447 \cdot \left(\frac{b}{t}\right) \cdot \sqrt{36} \qquad Q2 = 1.0825$$

$$Q3 := \frac{15000}{36 \cdot \left(\frac{b}{t}\right)^2} \qquad Q3 = 4.521$$

$$Q := \begin{cases} Q3 & \text{if } \frac{b}{t} \ge \frac{155}{\sqrt{36}} \\ Q1 & \text{if } \frac{b}{t} \le \frac{76}{\sqrt{36}} \\ Q2 & \end{cases}$$

$$\frac{76}{\sqrt{36}} = 12.67 \qquad \frac{155}{\sqrt{36}} = 26 \qquad \frac{b}{t} = 9.6$$

$$Q := Q1$$

$$Q = 1$$

BRACE SLENDERNESS RATIO DISTINGUISHING ELASTIC AND INELASTIC BUCKLING:

$$Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Q \cdot Fy}} \qquad Cc = 126$$

(AISC, EQ. 4-2)

FOR SLENDERNESS RATIO: $\frac{k \cdot l}{rx} = 58$ < $Cc = 126$

$$Fa := Q \cdot \left[1 - \frac{\left(k \cdot \frac{l}{rx}\right)^2}{2 \cdot Cc^2}\right] \cdot Fy \qquad Fa = 32143 \cdot lb \cdot in^{-2}$$

(AISC, EQ. 4-1)

C.2. ALLOWABLE BENDING STRESSES:

$$Fbx := Fy \qquad Fbx = 36000 \cdot lb \cdot in^{-2}$$

$$Fby := Fy \qquad Fby = 36000 \cdot lb \cdot in^{-2}$$

C.3. COMBINED STRESSES:

THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL COMPRESSION AND BENDING ARE EVALUATED ACCORDING TO AISC H1 FOR:

$$\frac{fa}{Fa} = 0.568 \qquad > 0.15$$

$$\frac{fa}{0.6 \cdot Fy} + \frac{fbx}{Fbx} + \frac{fby}{Fby} = 0.881 \qquad < 1.0 \text{ OK}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{\sqrt{3}} \qquad Fv = 20785 \cdot lb \cdot in^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 89 \cdot lb \cdot in^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot in^{-2}$$

CONCLUSION: THIS DOUBLE ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE WILL NOT FORM.

CHECK SINGLE ANGLE 5 X 3 X 5/16

(Member 11, sf-44)

REACTION:

FORCES:

$Px := 0 \cdot lb$

$Py := 115 \cdot lb$

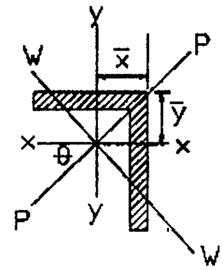
$Pz := 53600 \cdot lb$ "Tension"

MOMENTS

$Mx := 1025 \cdot lb \cdot in$

$My := 0 \cdot lb \cdot in$

$Mz := 0 \cdot lb \cdot in$



AT: $\theta := 0.112 \cdot \pi$

$Mpp := |Mx + My| \cdot \cos(\theta)$

$Mpp = 962 \cdot lb \cdot ft$

$Mww := |My - Mx| \cdot \sin(\theta)$

$Mww = 353 \cdot lb \cdot ft$

SECTION PROPERIES:

AREA OF THE ANGLE: $A := 0.85 \cdot (2.402) \cdot in^2$

THICKNESS OF THE ANGLE: $t := \frac{5}{16} \cdot in$

LENGTH OF LEGS: $Lx := 3 \cdot in$

$Ly := 5 \cdot in$

LENGTH OF THE MEMBER: $l := 293 \cdot in$

$Y := 1.68 \cdot in$

$X := 0.681 \cdot in$

MOMENT OF INERTIA: $Ixx := 6.263 \cdot in^4$

$Iyy := 1.747 \cdot in^4$

$Iww := 1.041 \cdot in^4$

$Ipp := 6.969 \cdot in^4$

RADIUS OF GYRATION: $rx := 0.937 \cdot in$

$ry := 0.744$

$rw := \sqrt{\frac{Iww}{A}}$ $\qquad rw = 0.714 \cdot ft$

$rp := \sqrt{\frac{Ipp}{A}}$ $\qquad rp = 1.848 \cdot ft$

MODULUS OF ELASTICITY $E := 29000000 \cdot lb \cdot in^{-2}$

STEEL YIELD STRESS: $Fy := 36000 \cdot lb \cdot in^{-2}$

1. CHECK AXIAL AND BENDING STRESSES:

A. ACTUAL AXIAL STRESS (fa):

FOR EFFECTIVE LENGTH FACTOR: $k := 0.65$

$$fa := \frac{Pz}{0.85 \cdot A} \qquad fa = 30885 \cdot lb \cdot ft^{-2}$$

B. ACTUAL BENDING STRESSES:

$$fbp := \frac{Lx \cdot Mpp \cdot \sin(\theta)}{Ipp}$$

$$fbp = 143 \cdot lb \cdot ft^{-2}$$

$$fbw := \frac{Mww \cdot \left(X^2 + Y^2\right)^{0.5}}{Iww}$$

$$fbw = 615 \cdot lb \cdot ft^{-2}$$

C. ALLOWABLE AXIAL AND BENDING STRESSES:
NOTE THAT EVALUATION ALLOWABLE STRESSES ARE EQUAL TO DESIGN ALLOWABLE STRESSES DIVIDED BY THE FACTORS OF SAFETY ORIGINALLY BUILT IN THE AISC EQUATIONS.

FOR SLENDERNESS RATIO: $\frac{kl}{rw} = 267 \quad < \quad 300$

$$Fa\_t := Fy \qquad Fa\_t = 36000 \cdot lb \cdot ft^{-2}$$

C.2. ALLOWABLE BENDING STRESSES:

$$Fbp := Fy \qquad Fbp = 36000 \cdot lb \cdot ft^{-2}$$

$$Fbw := Fy \qquad Fbw = 36000 \cdot lb \cdot ft^{-2}$$

C.3. COMBINED STRESSES:
THE COMBINED STRESSES FOR MEMBERS LOADED IN AXIAL TENSION AND BENDING ARE:

$$\frac{fa}{Fa\_t} + \frac{fbp}{Fbp} + \frac{fbw}{Fbw} = 0.879 \qquad < 1.0 \text{ ok}$$

2. CHECK SHEAR STRESSES:

A. THE SHEAR YIELD STRESS PER AISC, SECTION F4:

$$Fv := \frac{Fy}{3^{0.5}} \qquad Fv = 20785 \cdot lb \cdot ft^{-2}$$

B. ACTUAL SHEAR STRESSES:

$$fvx := \frac{Mz}{X \cdot t \cdot Lx} + \frac{Px}{t \cdot Lx} \qquad fvx = 0 \cdot lb \cdot ft^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot ft^{-2}$$

$$fvy := \frac{Mz}{Y \cdot t \cdot Ly} + \frac{Py}{t \cdot Lx} \qquad fvy = 123 \cdot lb \cdot ft^{-2} \quad < \quad Fv = 20785 \cdot lb \cdot ft^{-2}$$

CONCLUSION: THIS ANGLE FOR THE REACTIONS ABOVE, DID NOT EXCEED EVALUATION ALLOWABLE STRESSES. THEREFORE, A PLASTIC HINGE DID NOT FORM.

Appendix D: Repair Notes and Drawings

General Retrofit Notes

1. The contractor shall provide adequate bracing as required for the stability of the structure during all phases of retrofit/construction.

2. All dimensions, sizes, shapes, and conditions shall be verified before fabrication of new members to ensure proper fit.

3. All workmanship and material shall conform to the latest edition of the AISC specification for the design of the structural components.

4. All structural steel shall be in conformance with ASTM A-36.

5. All welding shall be done by the shielded arc process using approved electrodes per A.W.S. specification E70xx. All welding shall meet the requirements of the latest Structural Welding Code D-11.

6. High strength bolts shall conform to the ASTM-A325. The nuts shall be heavy Hex., Grade C, conforming to ASTM-A563. Comparable riveted bolts may be used instead.

7. Paint all sand blasted surfaces after corrosion removal to bare metal. If corrosion is detected between steel member under consideration and surrounding concrete, remove concrete to expose corroded section. Apply one coat zinc chromate primer conforming to Federal Specification TT-P-645 to a dry film thickness of 1.3 mil. Apply two coats of Silicone Alkyd paint conformed to TT-E-1593, minimum dry film thickness of 1.1 mil. per coat.

8. Paint all new steel members used in repair by applying coats of zinc chromate primer and Silicon Alkyd paint as described in Note 7.

9. Note for Drawing D4: Remove concrete, sand blast all corroded surfaces, repair flanges and webs with splits by applying steel plate across the corroded flanges and webs, paint as recommended in Note 7 above, and cast concrete.

10. Note for Drawing D5: This repair was used previously in Building 8 Hangar. Drawing NAVFAC 5078784 in 1982. Same repair techniques are recommended. More details may be found in Drawing NAVFAC 5078784. Brace the column, remove concrete around column at floor level, and resurface floor with epoxy to seat support steel plate and angles flat against column. Remove concrete (if it exists) around column flanges and webs to expose corroded metal and bolts. Remove corroded sections and sand blast the lightly corroded surfaces. Replace high strength foundation grout. Install a new base plate and anchoring rods. Replace new section of the column and weld it to the existing column and to the new base plate. Install supporting plates. Paint as recommended in Note 7 above. Cast concrete.

Figure D-1. CCAD, TX, general notes for repair drawings.

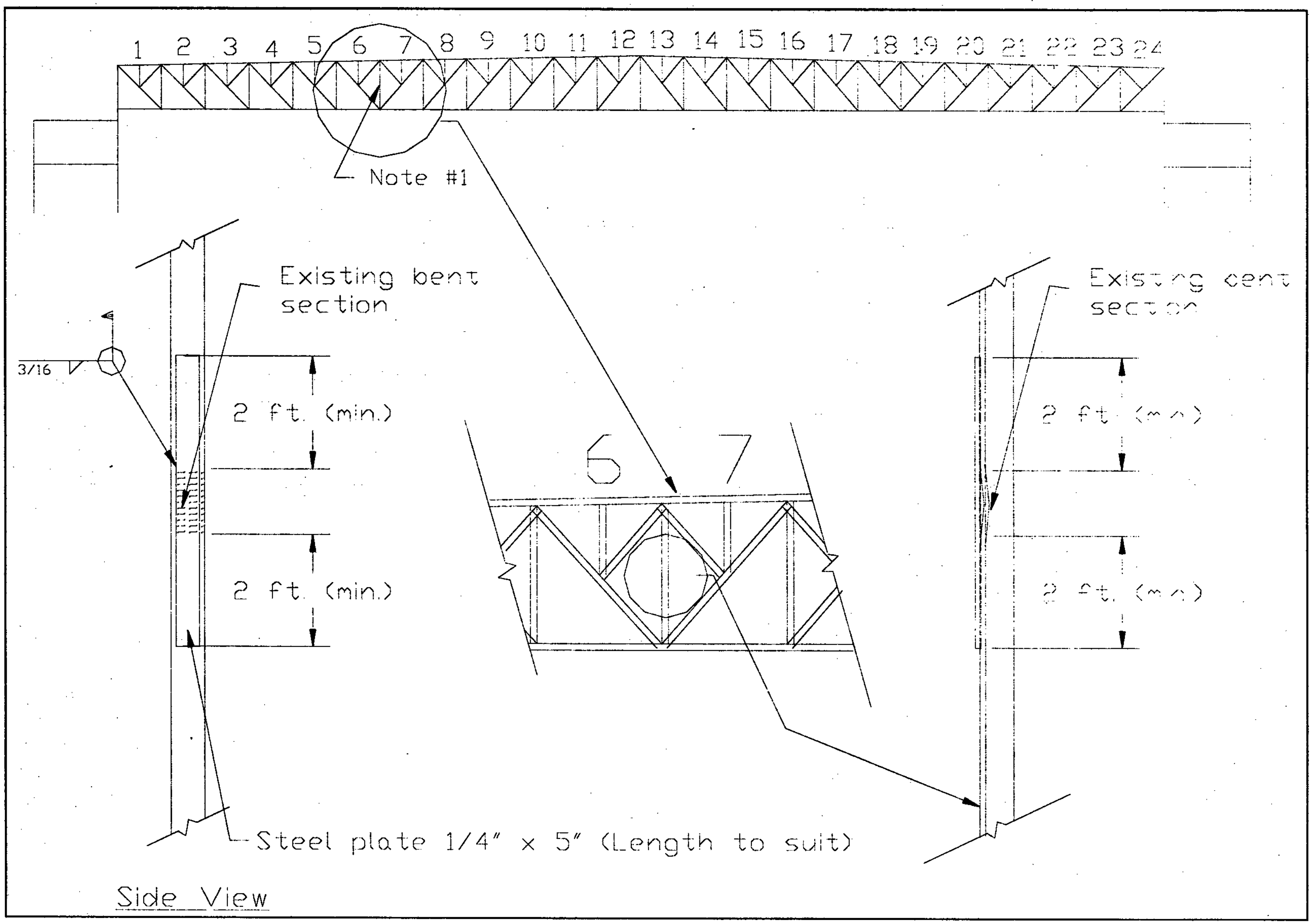


Figure D-2. CCAD, TX, repair of bent vertical member.

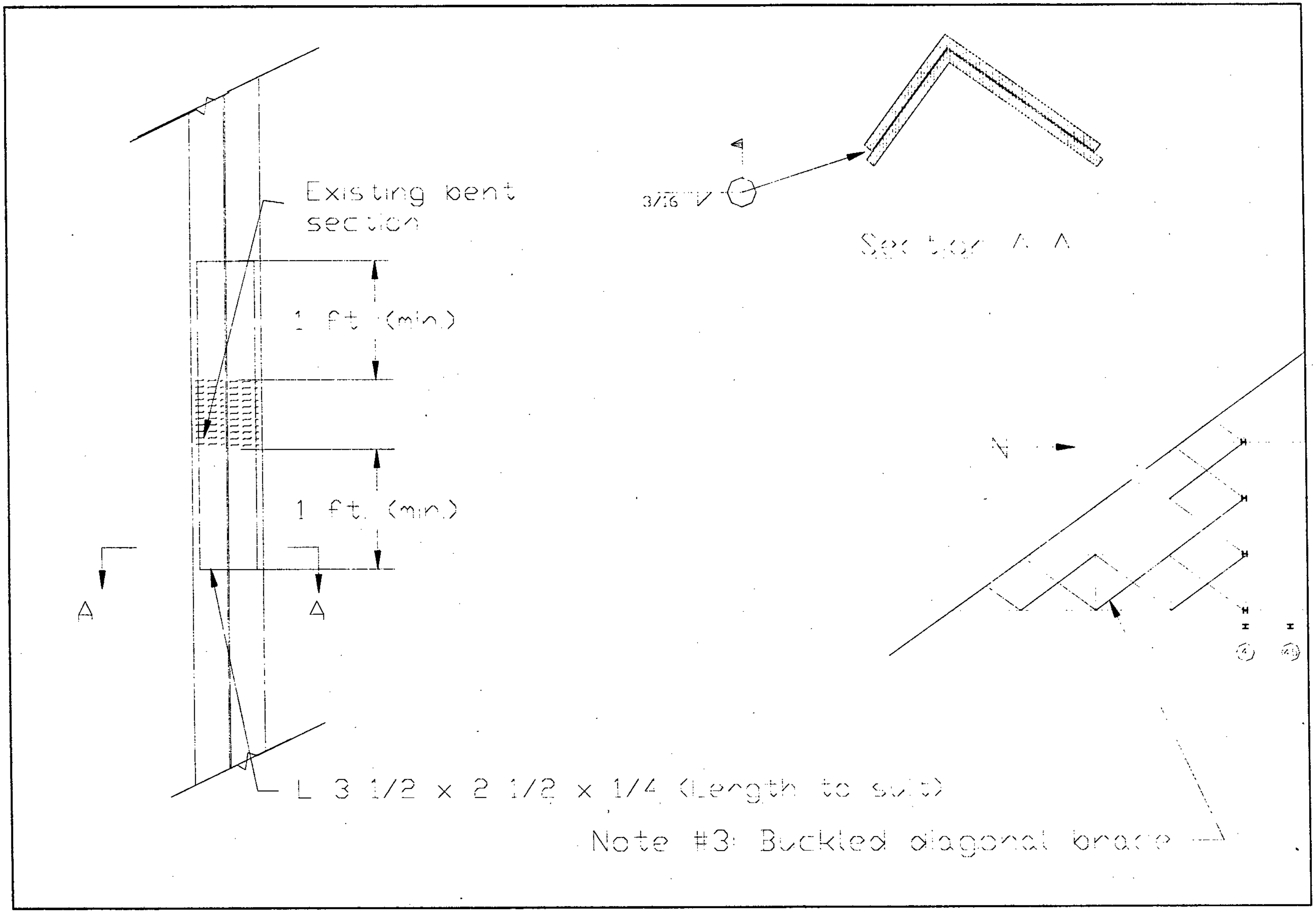


Figure D-3. CCAD, TX, repair of bent horizontal bracing member.

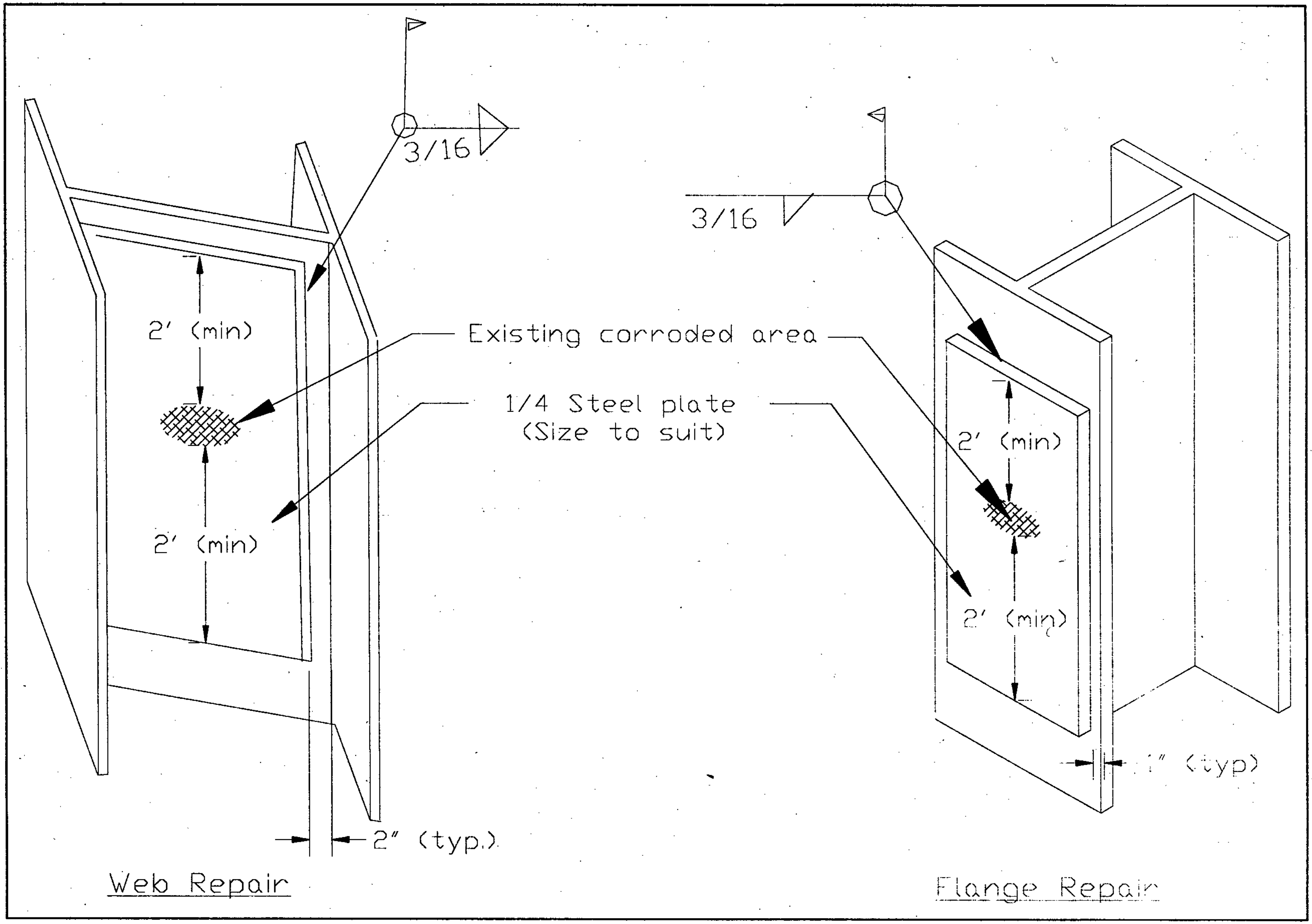


Figure D-4. CCAD, TX, typical repair of splits in columns from corrosion.

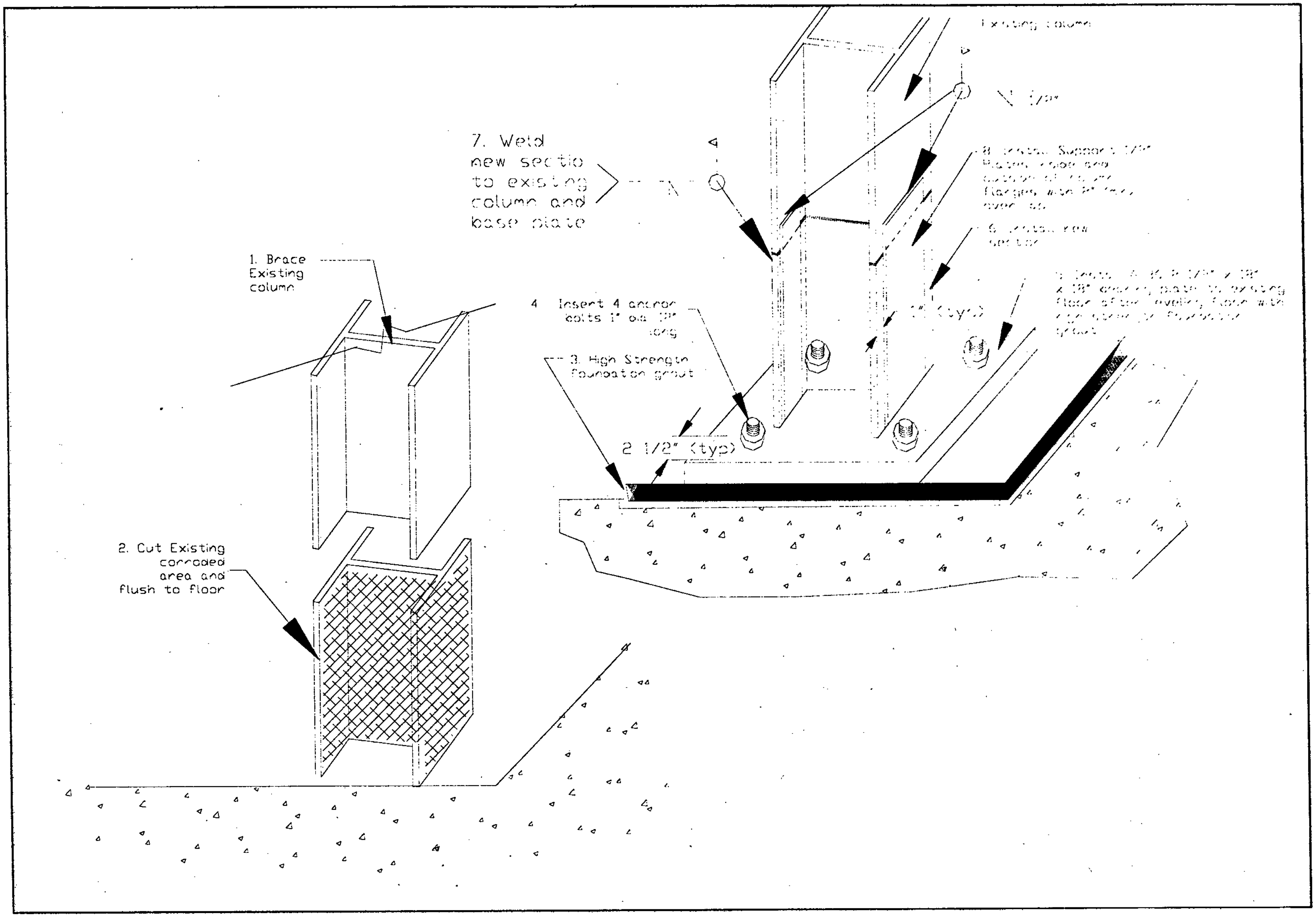


Figure D-5. CCAD, TX, proposed repair for corroded base columns.

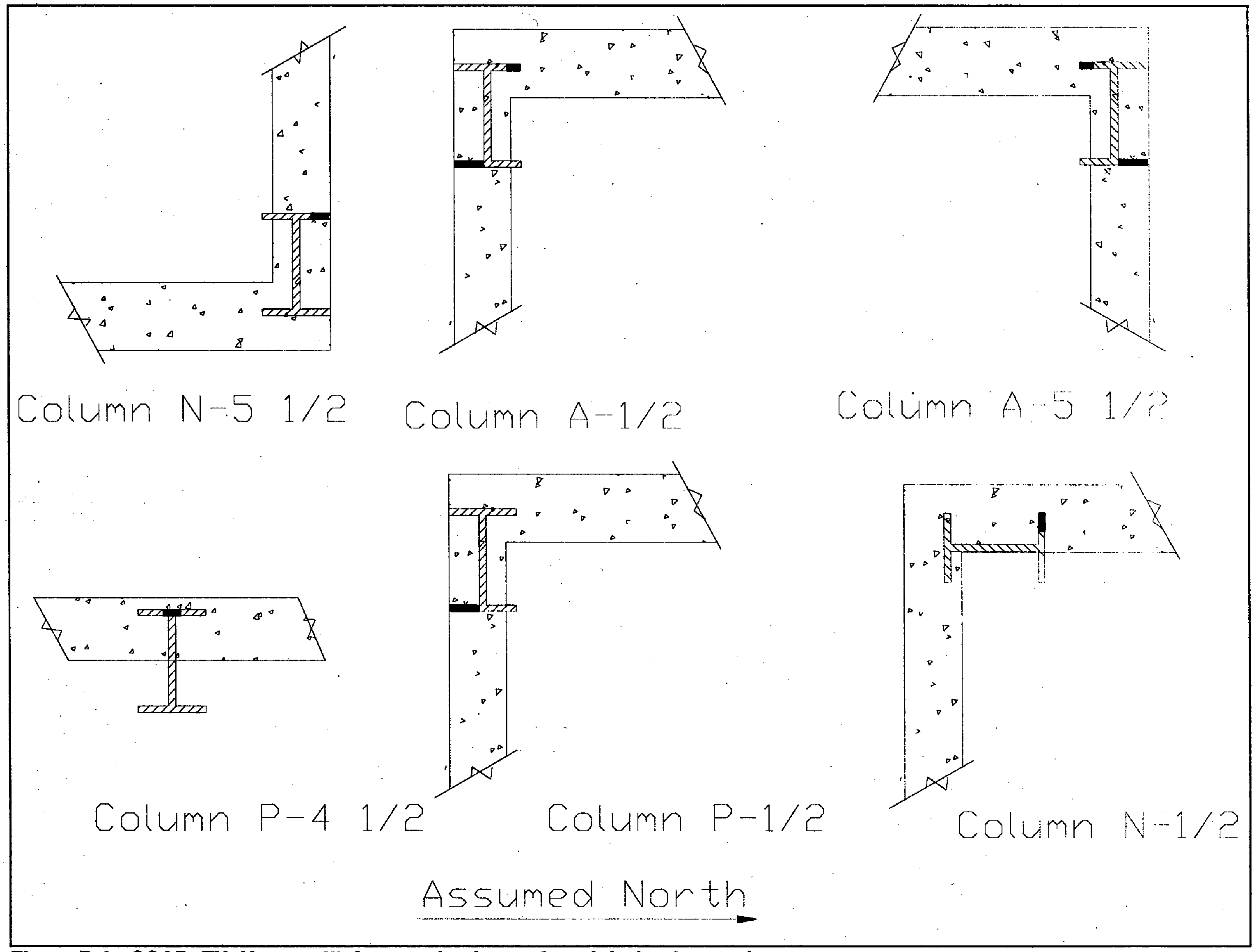


Figure D-6. CCAD, TX, Hangar 47, fractured columns found during inspection.

Appendix E: Retrofit Schematic Diagrams

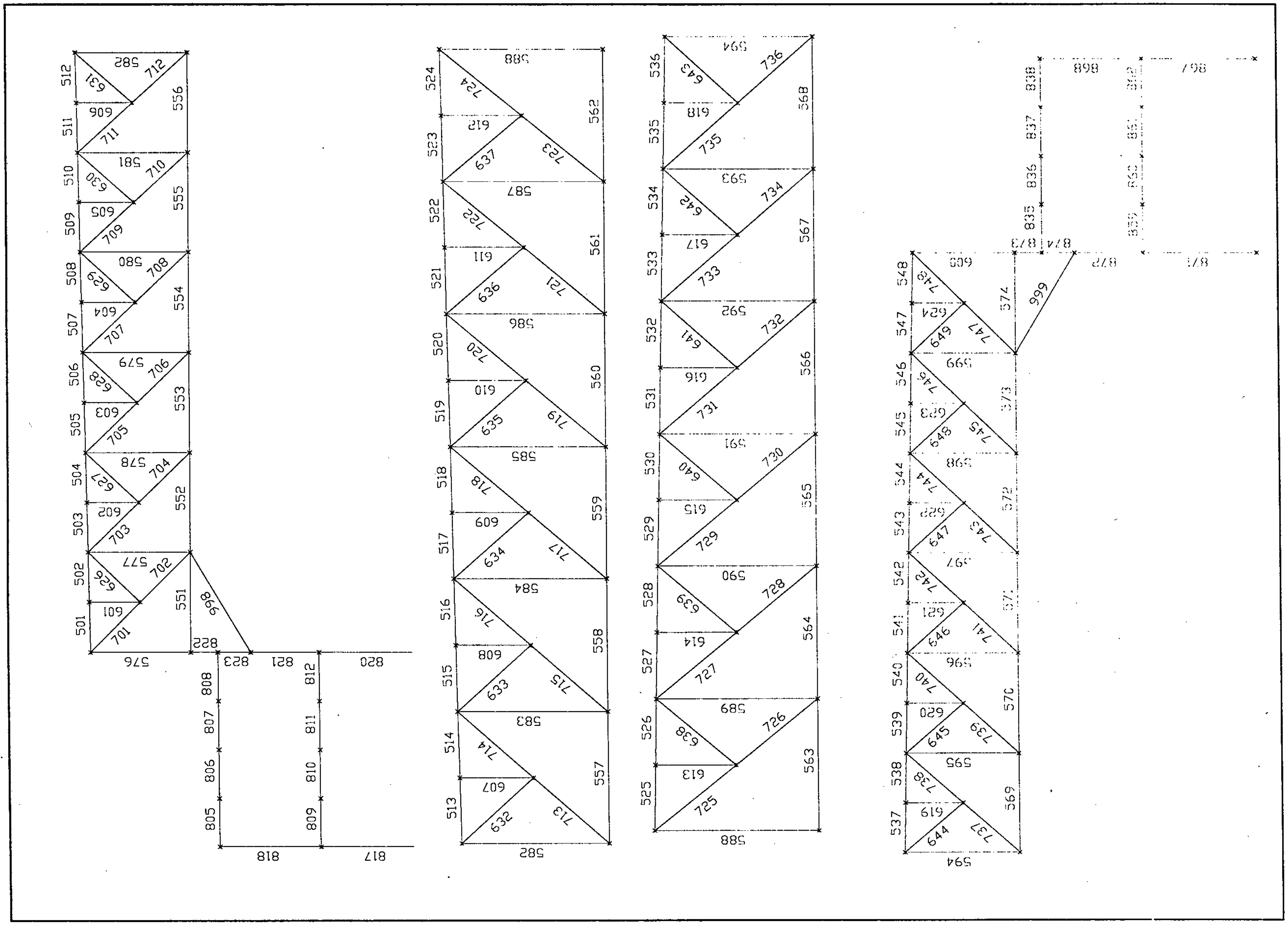


Figure E-1. CCAD, TX, element numbers of Truss T1 with knee braces, Hangars 43 and 47.

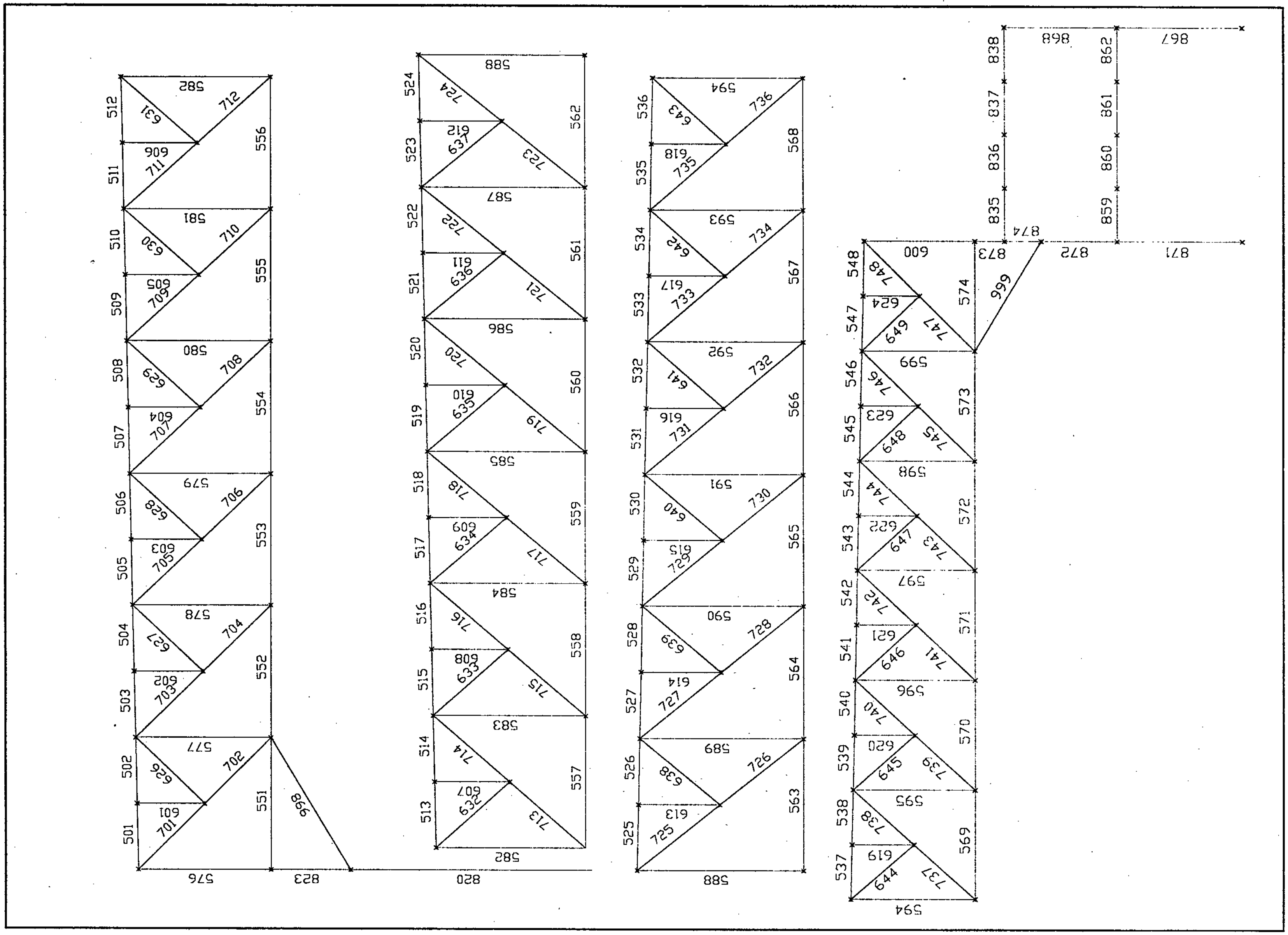


Figure E-2. CCAD, TX, element numbers of Truss T1 with knee braces, Hangars 44 and 45.

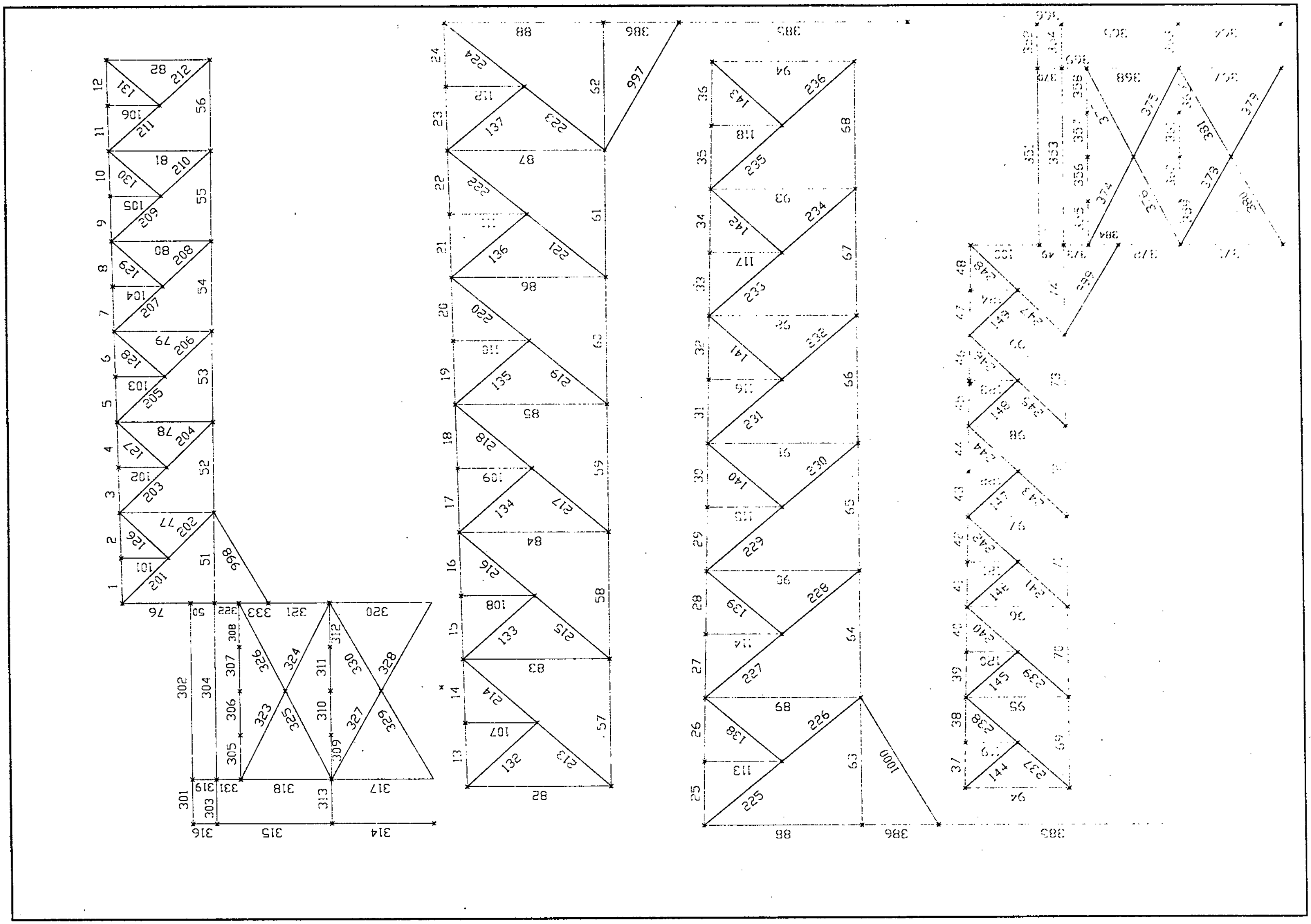


Figure E-3. CCAD, TX, element numbers of Truss T2 with knee braces, Hangars 43 and 47.

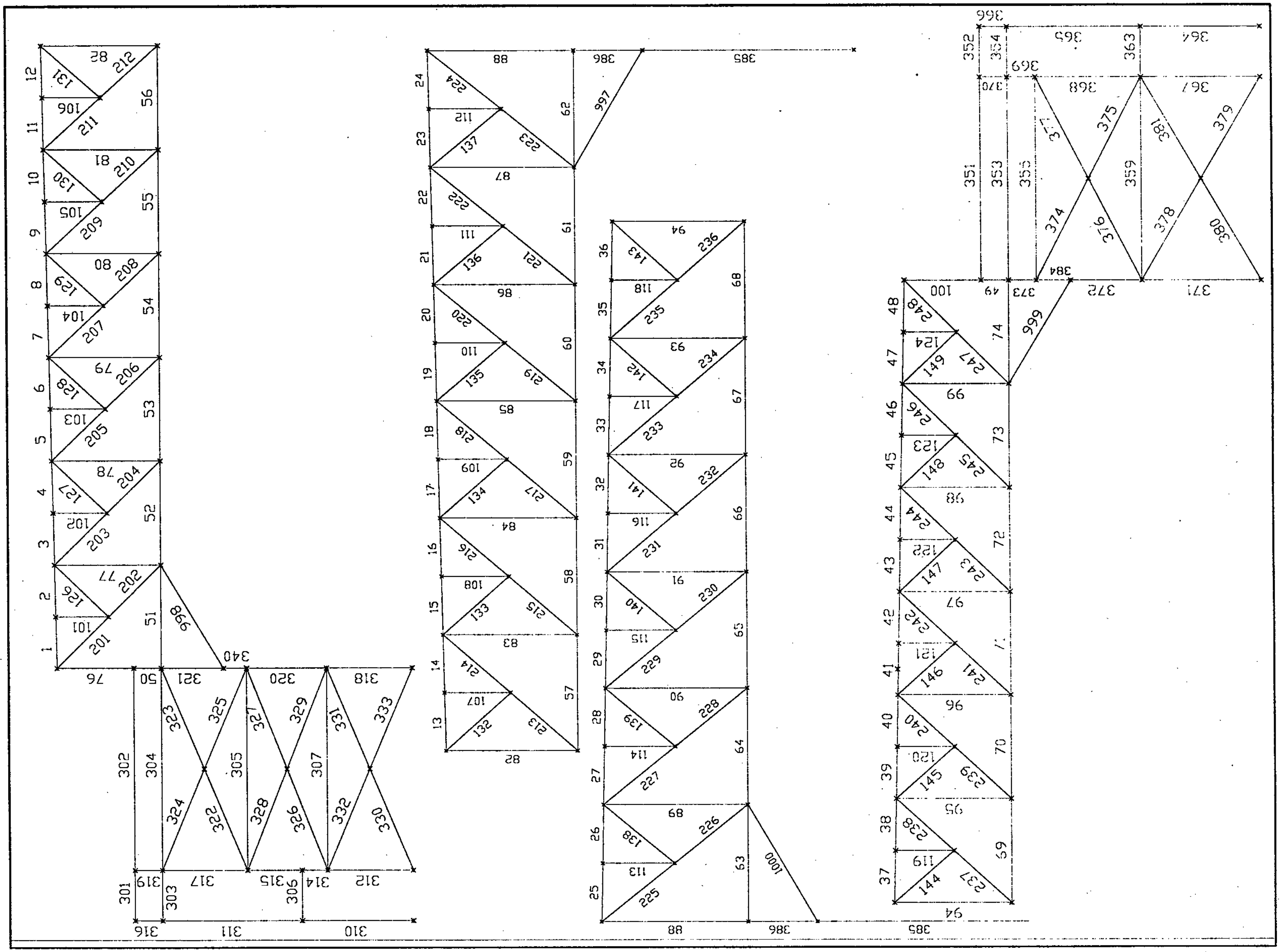


Figure E-4. CCAD, TX, element numbers of Truss T2 with knee braces, Hangars 44 and 45.

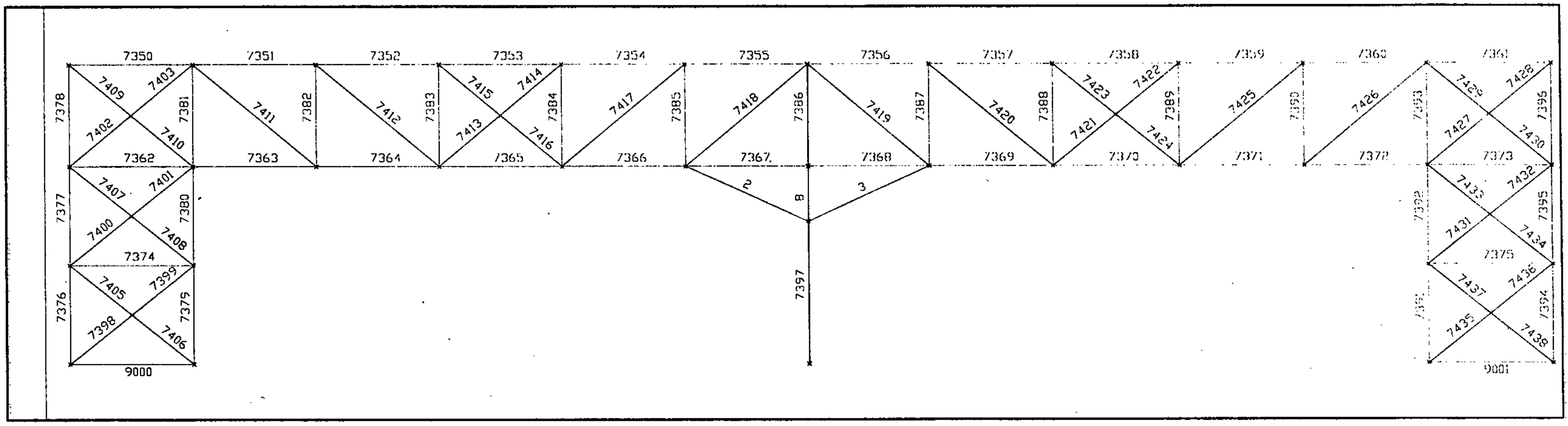


Figure E-5. CCAD, TX, element numbers for Truss T3, all hangars.

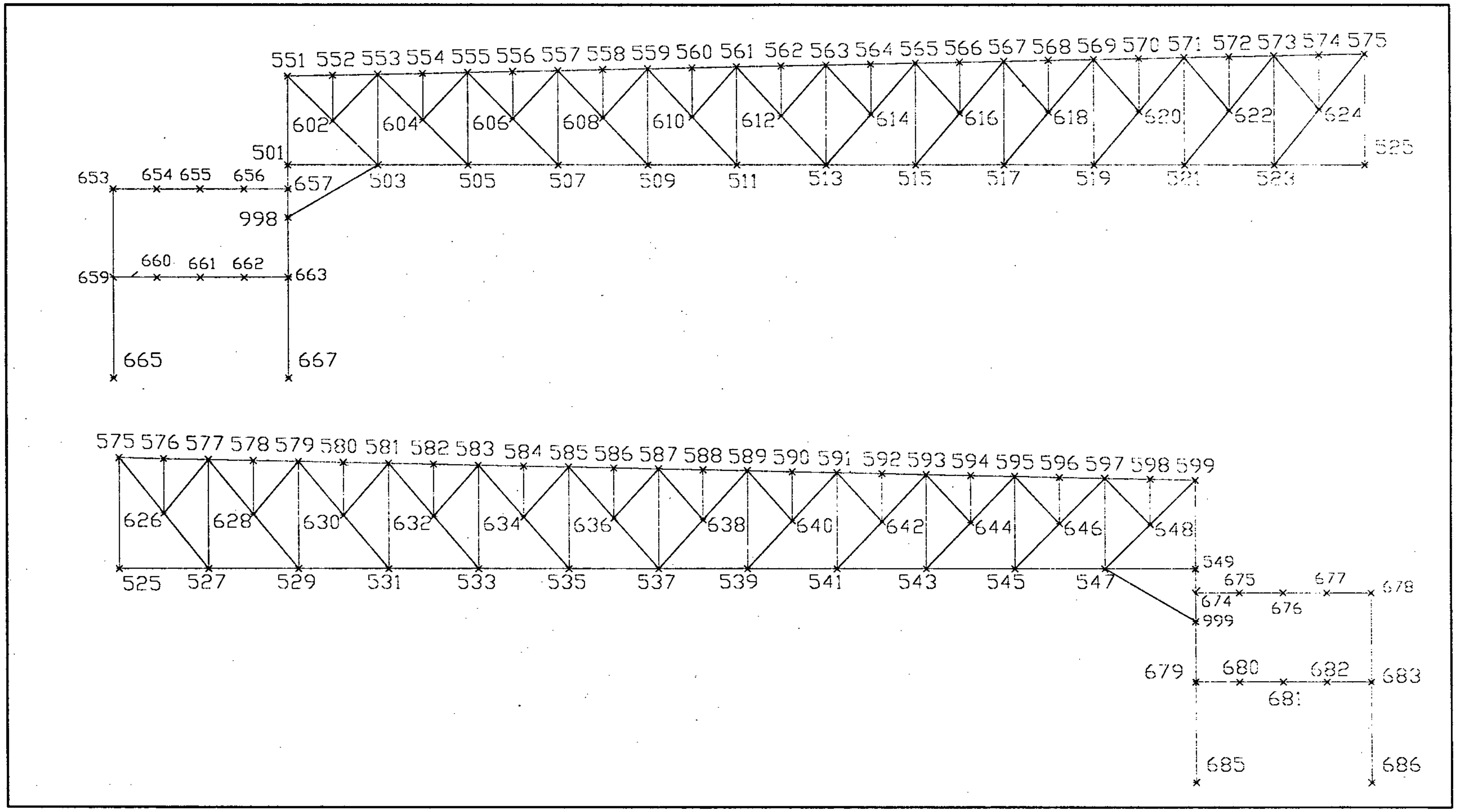


Figure E-6. CCAD, TX, joint numbers for Truss T1 with knee braces, Hangars 43 and 47.

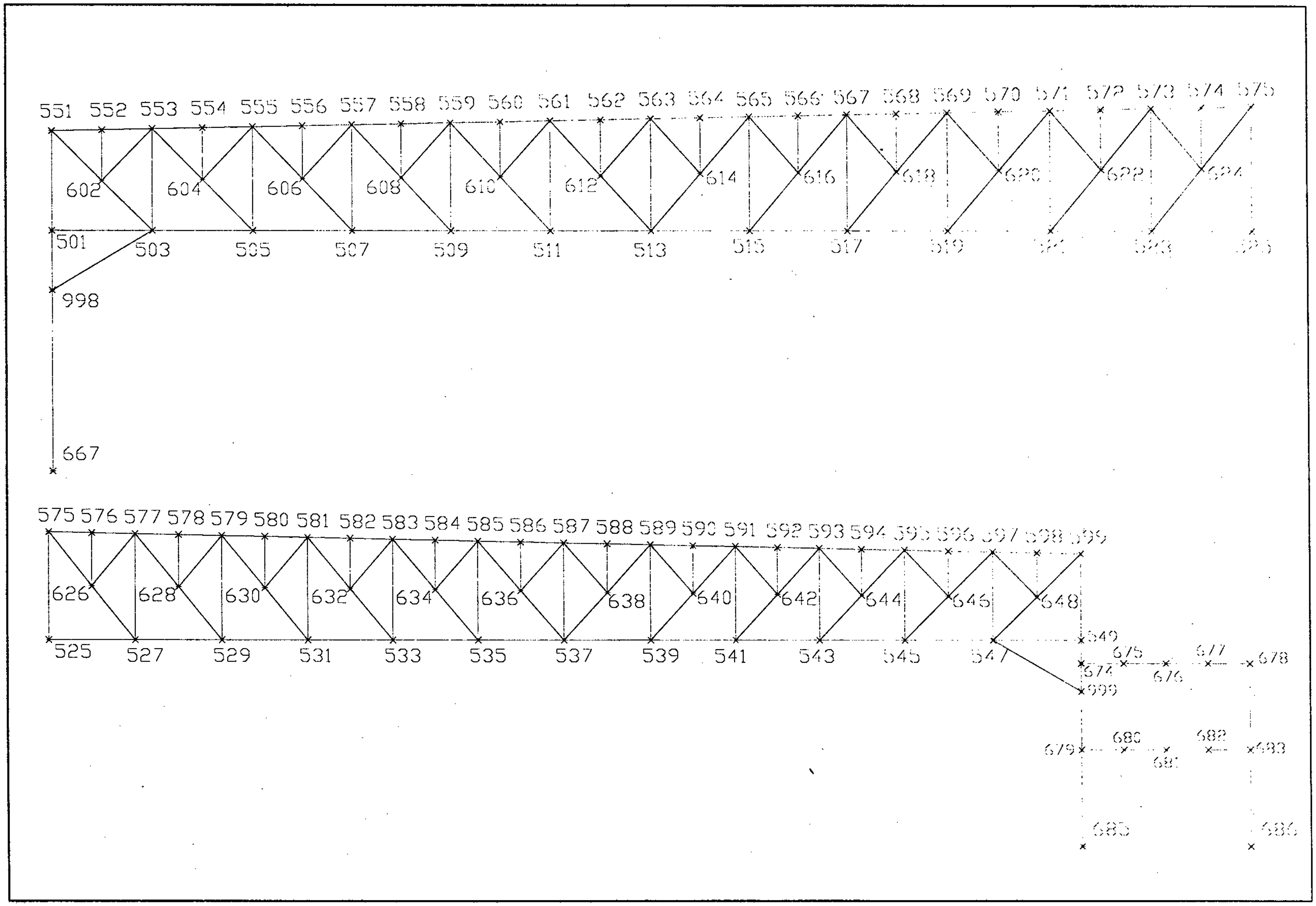


Figure E-7. CCAD, TX, joint numbers for Truss T1 with knee braces, Hangars 44 and 45.

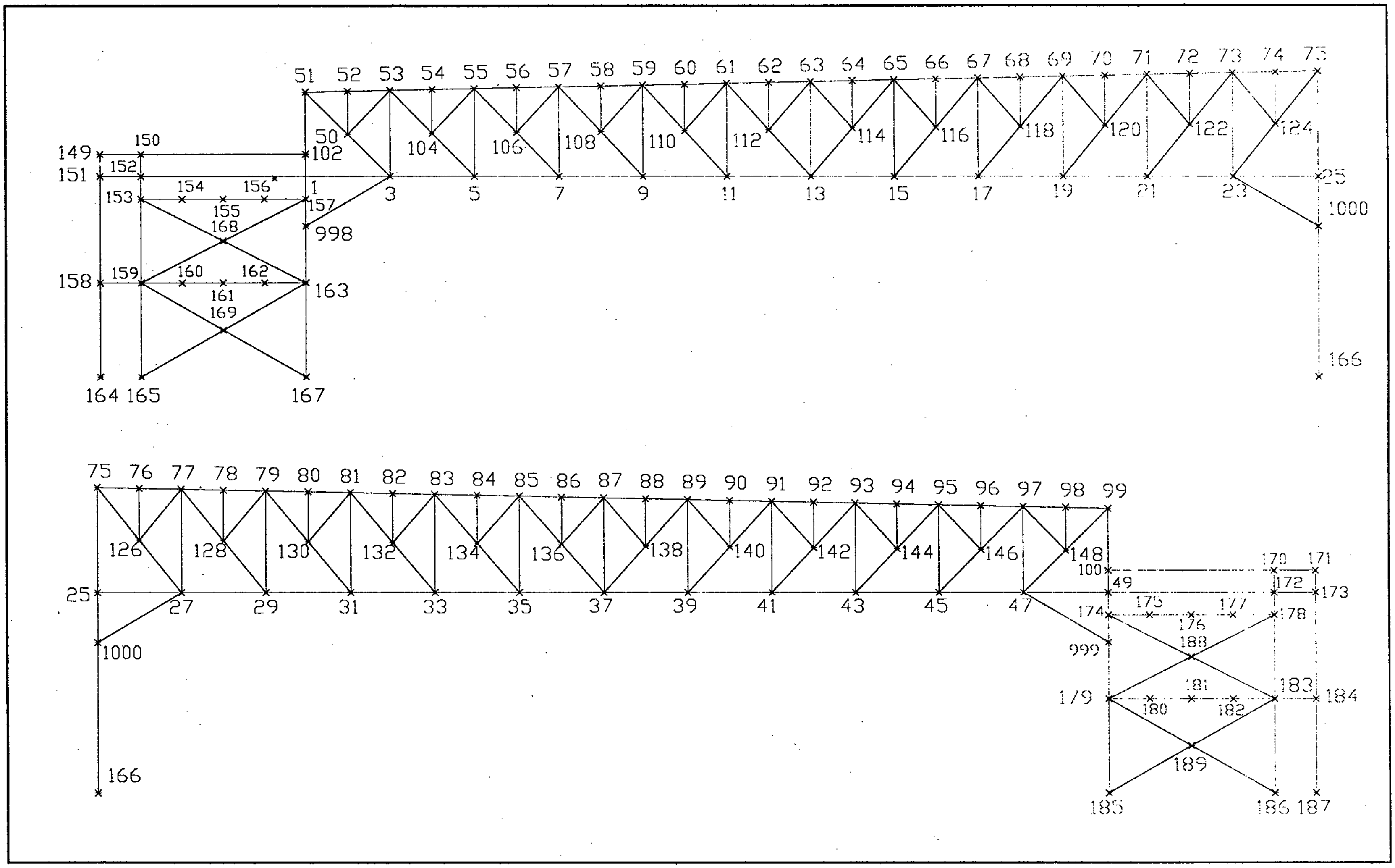


Figure E-8. CCAD, TX, joint numbers for Truss T2 with knee braces, Hangars 43 and 47.

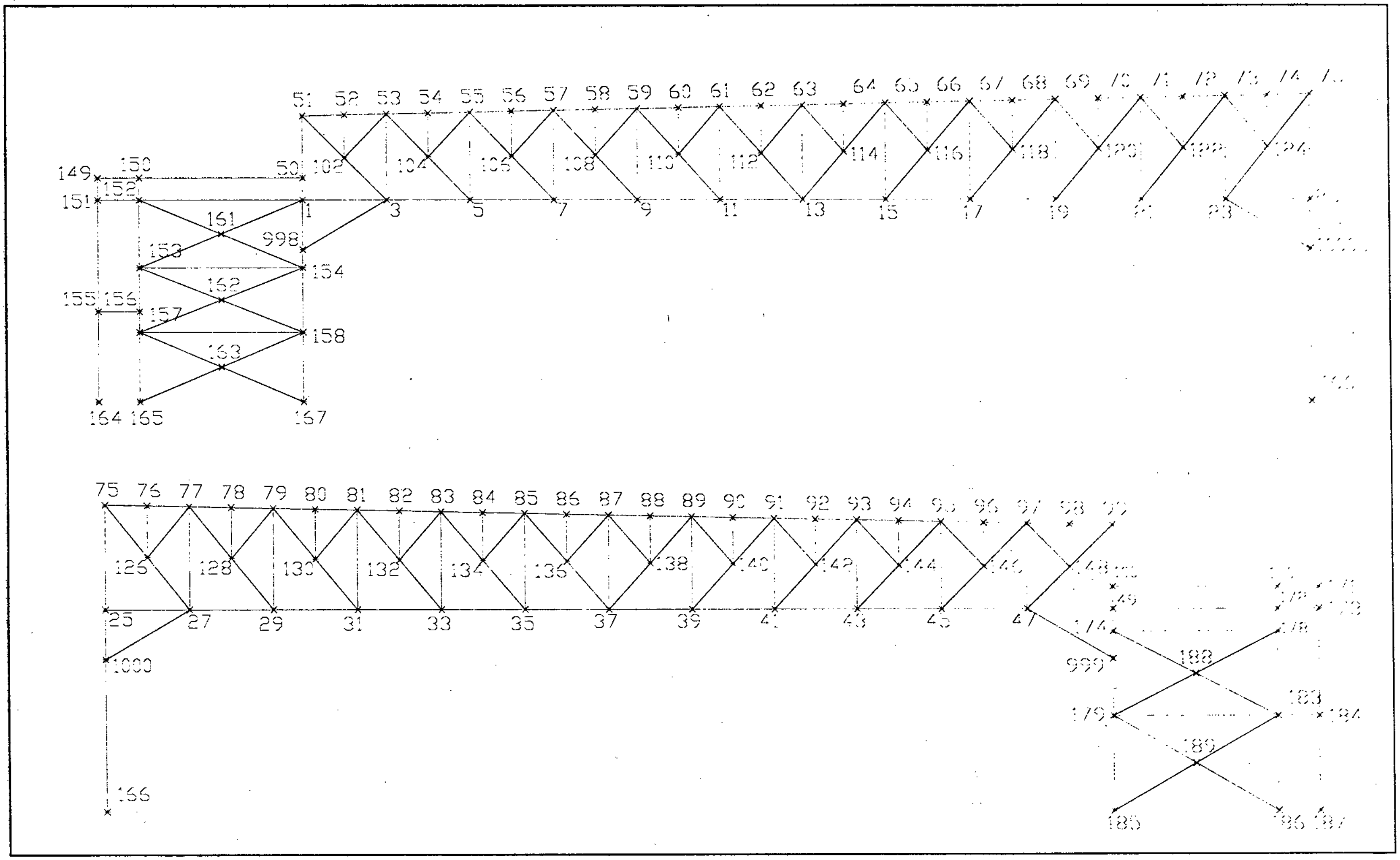


Figure E-9. CCAD, TX, Truss T2 with knee braces, Hangars 44 and 45.

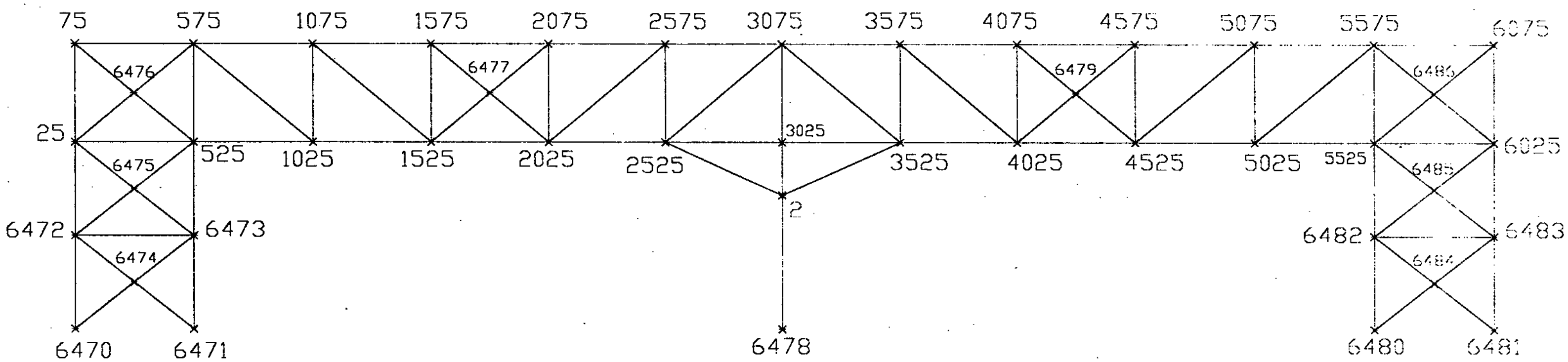


Figure E-10. CCAD, TX, Truss T3 with knee braces, all hangars.

Appendix F: Retrofit Notes and Technical Drawings

General Retrofit Notes

1. The contractor shall provide adequate bracing as required for the stability of the structure during all phases of retrofit/construction.

2. All dimensions, sizes, shapes and conditions shall be verified before fabrication of new members to ensure proper fit.

3. All workmanship and material shall confirm the latest edition of the AISC specification for the design of the structural components.

4. All structural steel shall be in conformance with ASTM A-36.

5. All welding shall be done by the shielded arc process using approved electrodes per A.W.S. specification E70xx. All Welding Shall Meet the Requirements of the Latest Structural Welding Code D-11.

6. High strength bolts shall conform the ASTM-A325. The nuts shall be heavy Hex., Grade C, conforming to ASTM-A563. Comparable riveted bolts may be used instead.

7. Paint all new steel members shall be painted by apply one coat zinc chromate primer conforming to Federal Specification TT-P-645 to a dry film thickness of 1.3 mil. Apply two coat of Silicone Alkyd paint conformed to TT-E-1593, minimum dry film thickness of 1.1 mil. Per coat.

Figure F-1. CCAD, TX, general notes for retrofit drawing.

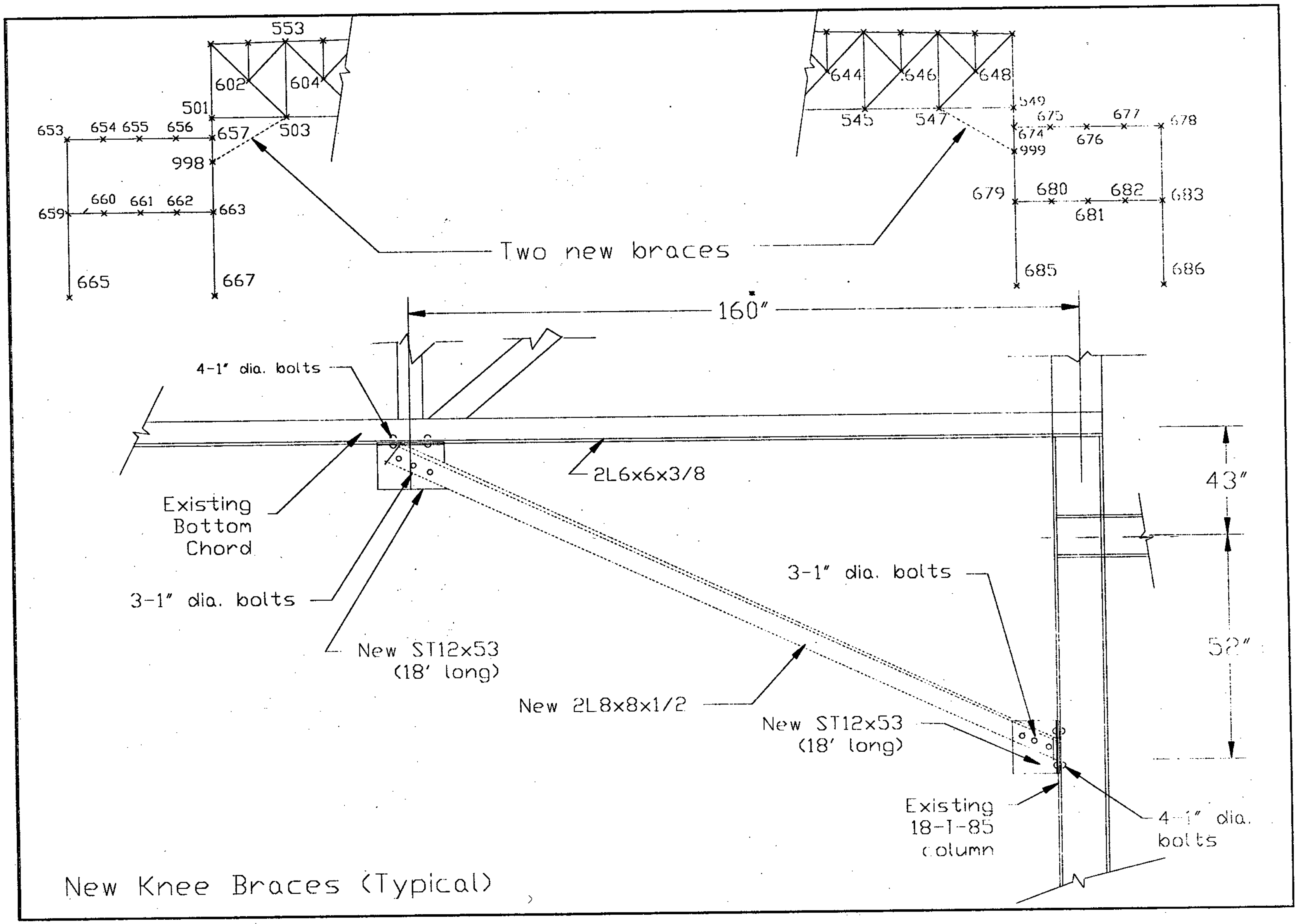


Figure F-2. CCAD, TX, new knee braces for Truss T1, Hangars 43 and 47.

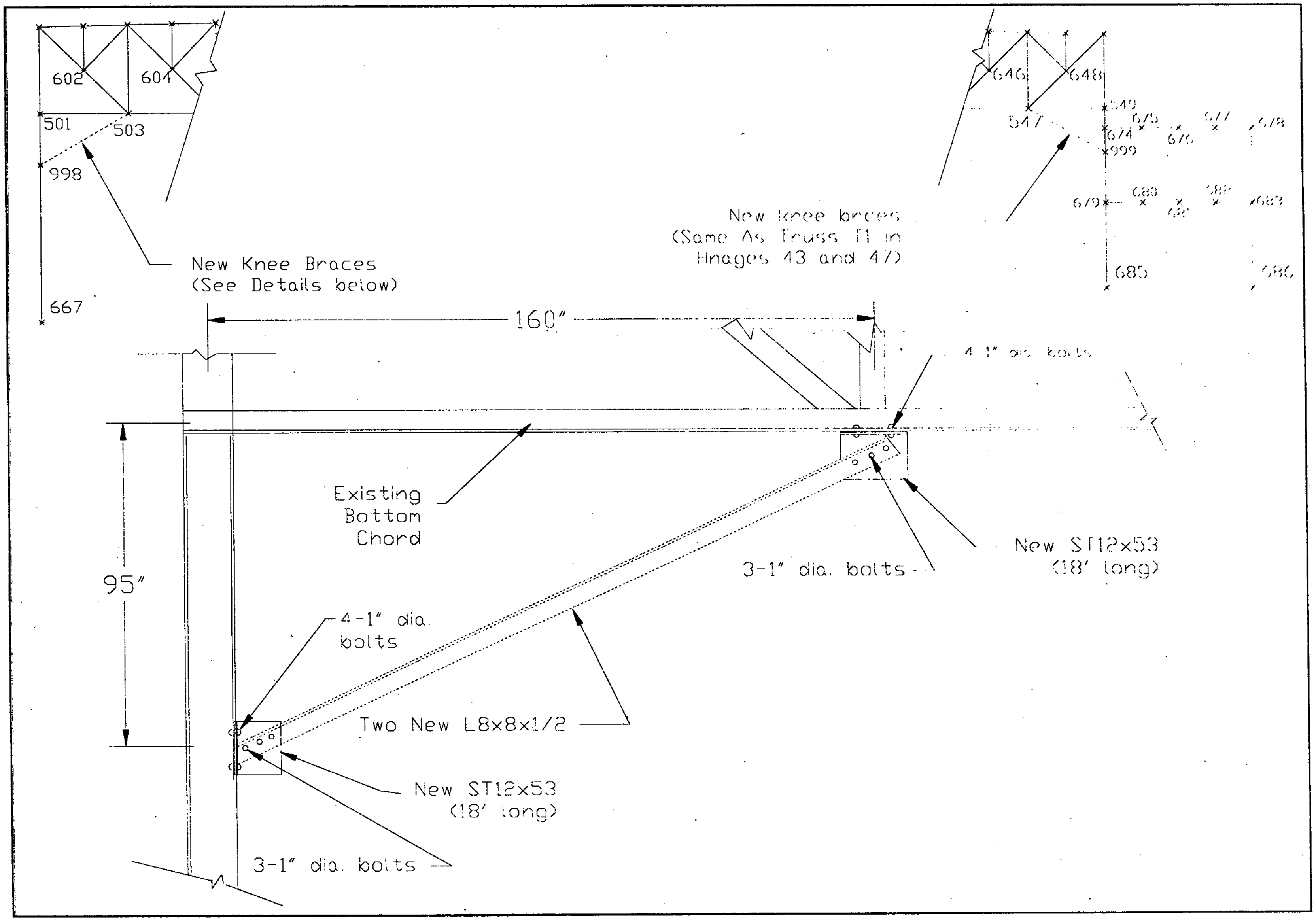


Figure F-3. CCAD, TX, new knee braces for Truss T1, Hangars 44 and 45.

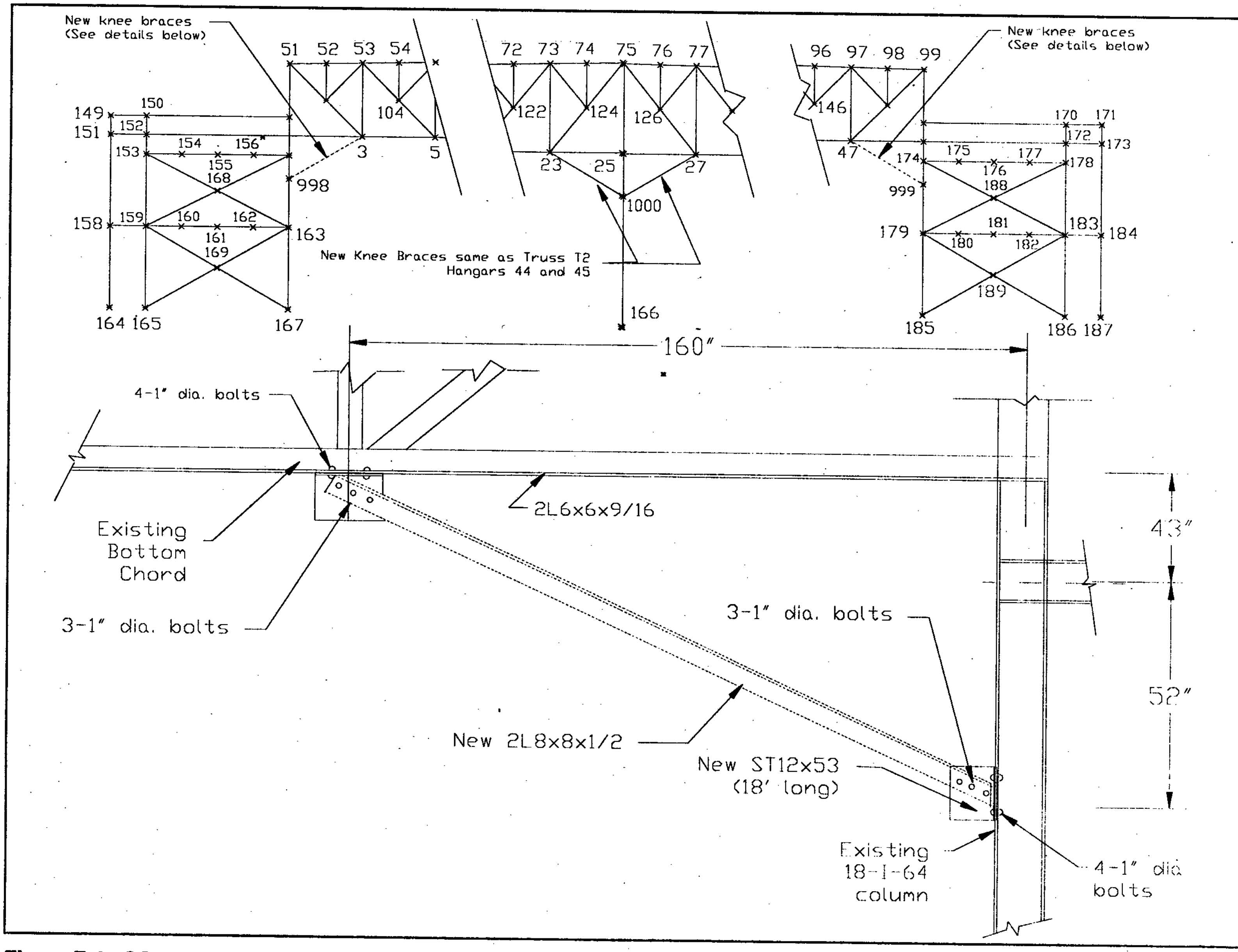


Figure F-4. CCAD, TX, new knee braces for Truss T2, Hangars 43 and 47.

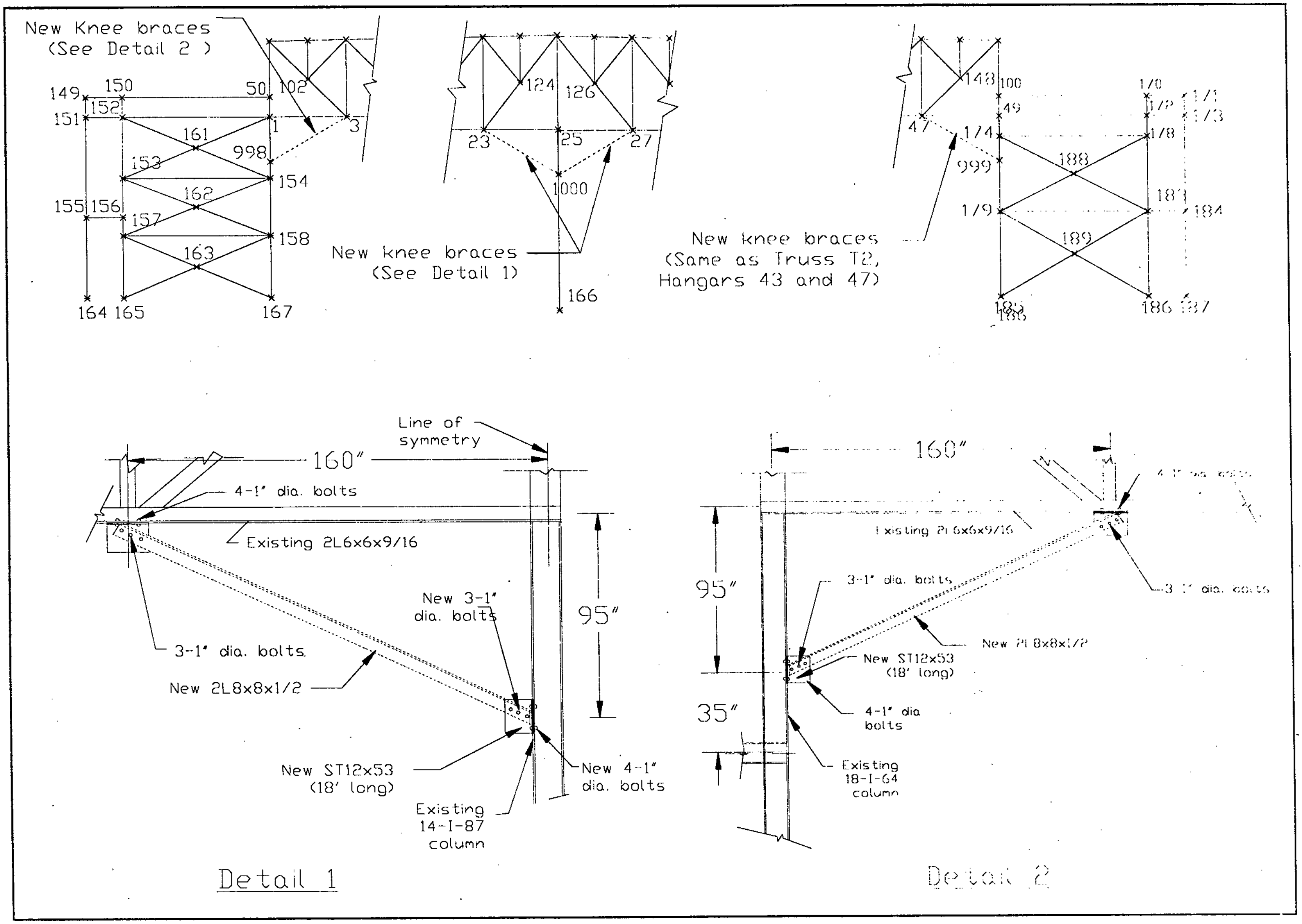


Figure F-5. CCAD, TX, new knee braces for Truss T2, Hangars 44 and 45.

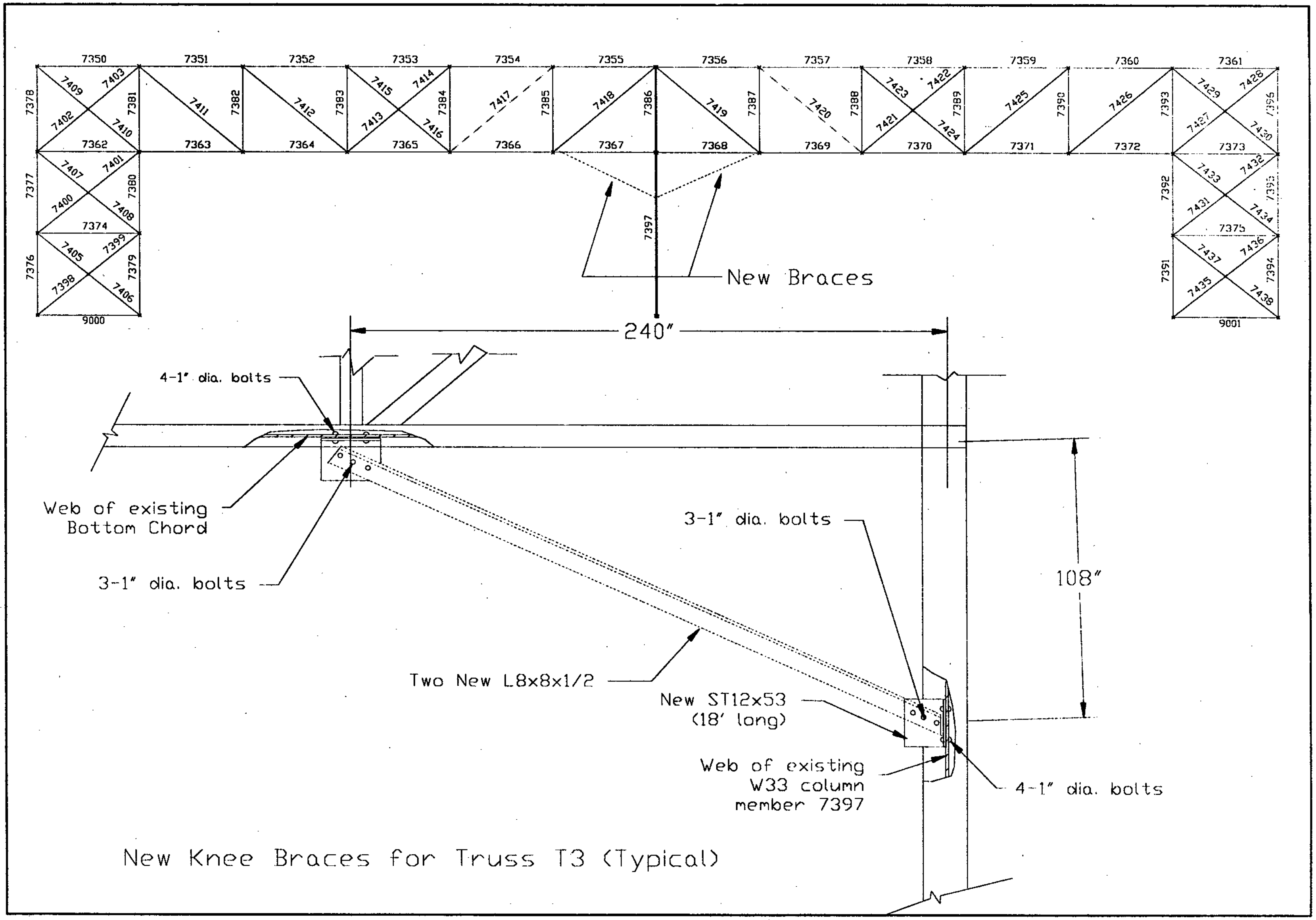


Figure F-6. CCAD, TX, new diagonal braces for Truss T3, all hangars (except 47).

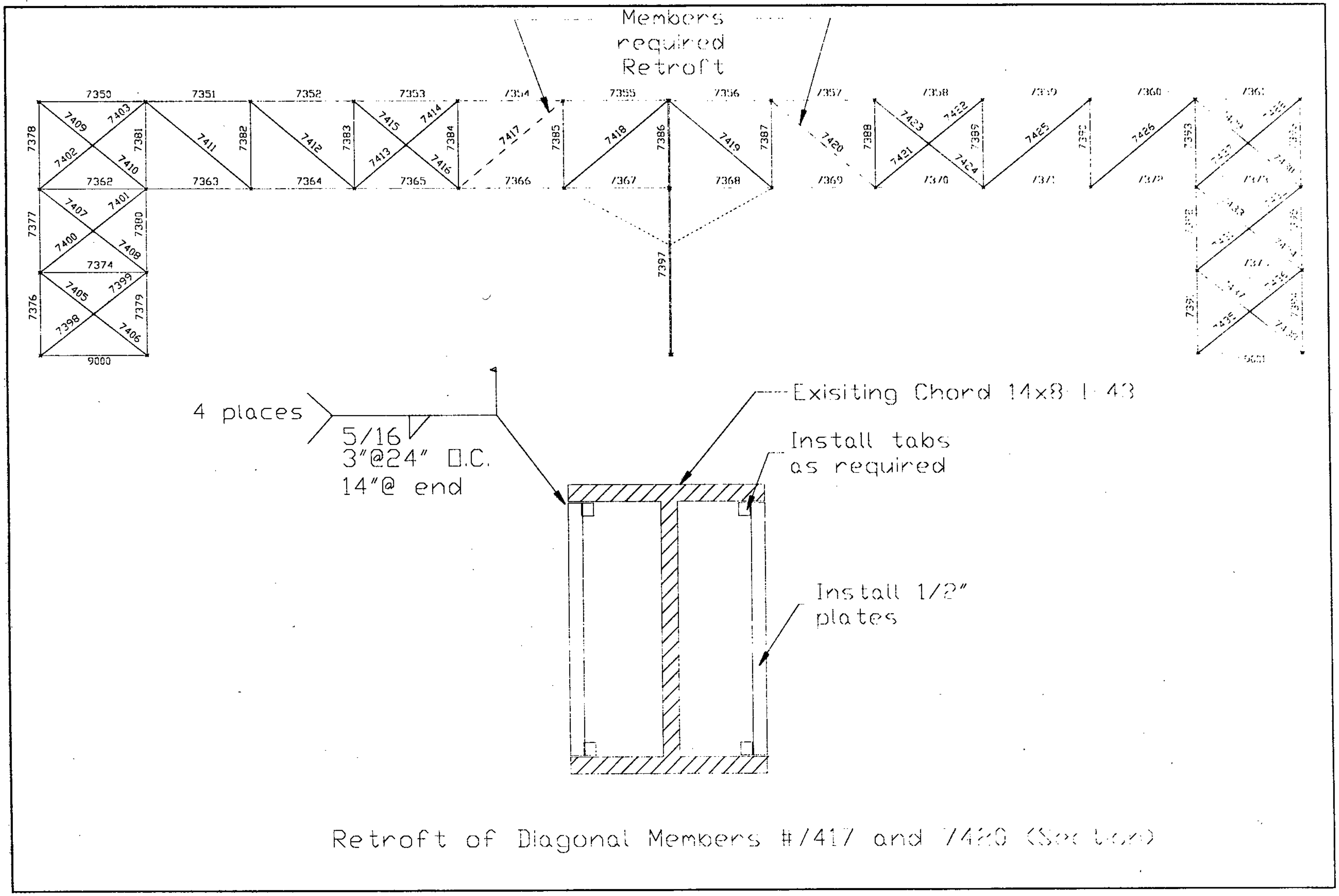


Figure F-7. CCAD, TX, retrofit of elements failed in analysis, Truss T3, Hangars 43, 44, and 45.

Appendix G: SAP90 Structural Analysis Data for Retrofitted Trusses

Truss T1 Hangars 44 and 45   Knee Braces   Average Wind

```
C SAP90 INPUT

system
L=12
C
C
C
joints
C      Truss Joints T1
501  x=0     z=0          y=240
549  x=3840  z=0          y=240 g=501,549,2
551  x=0     z=160        y=240
575  x=1920  z=200        y=240 g=551,575,1
599  x=3840  z=160        y=240 g=575,599,1
602  x=80    z=80
612  x=880   z=88.333           g=602,612,2
614  x=1040  z=91.6667    y=240
624  x=1840  z=100        y=240 g=614,624,2
626  x=2000  z=100        y=240
636  x=2800  z=91.6667    y=240 g=626,636,2
638  x=2960  z=88.3333    y=240
648  x=3760  z=80         y=240 g=638,648,2
C      Bracing Frame Joints T1
667  x=0     z=-384    y=240
674  x=3840  z=-43     y=240
678  x=4152  z=-43     y=240 g=674,678,1
679  x=3840  z=-203.5  y=240
683  x=4152  z=-203.5  y=240 g=679,683,1
685  x=3840  z=-384    y=240
686  x=4152  z=-384    y=240
998  x=0     z=-95     y=240
999  x=3840  z=-95     y=240

restraints
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
nm=57 nl=18 z=-1,0,0,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333   E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
```

```
9  sh=213x2.5x1/4-3     w=.00075
10 sh=213x2x5/16-3      w=.0008333
11 sh=216x6x1/2-3       w=.0030667
12 sh=218x6x1/2-3       w=.0038333
13 sh=214x3x5/16-3      w=.0012
14 sh=216x4x3/8-3       w=.00205
15 sh=215x3x1/4-3       w=.0011
16 sh=215x3.5x5/16-3    w=.00145
17 sh=w18x65            w=.00541667
18 sh=w24x68            w=.005667
19 sh=w18x46            w=.0038333
20 sh=w18x65            w=.00541667
21 sh=216x6x5/8-3       w=.0040333
22 sh=213x2.5x1/4-3     w=.00075
23 sh=w8x18             w=.0015
24 sh=w12x22            w=.0018333
25 sh=w10x22            w=.0018333
26 sh=w14x30            w=.0025
27 sh=w8x31             w=.00258333
28 sh=w12x26            w=.0021667
29 sh=w10x12            w=.001
30 sh=w10x22            w=.0018333
31 sh=14x3x1/4          w=.00048333
32 sh=13.5x2.5x1/4      w=.000408333
33 sh=215x3.5x3/8-3     w=.0017333
34 sh=w14x90            w=.0075
35 sh=w14x145           w=.01208333
36 sh=w33x201           w=.01675
37 sh=217x4x1/2         w=.00298
38 sh=w14x74            w=.0061667
39 sh=w14x43            w=.00358333
40 sh=215x3x5/16        w=.0013667
41 sh=s12x50            w=.0041667
42 sh=w14x61            w=.00508333
43 sh=w6x16             w=.001333
44 sh=213x2.5x1/4-3     w=.00075
45 sh=mc12x31           w=.00258333
46 sh=mc12x31           w=.00258333
47 sh=mc12x31           w=.00258333
48 sh=216x3.5x3/8-3     w=.00195
49 sh=215x3x5/16-3      w=.0013667
50 sh=215x5x3/8         w=.00205
51 sh=13x2.5x1/4        w=.000375
52 sh=13x2x1/4          w=.000341667
53 sh=w14x30            w=.0025
54 sh=215x3.5x5/16-3    w=.00145
55 sh=w14x34            w=.0028333
56 sh=14x3x5/16         w=.0006
57 sh=2L8x8x1/2
C       Live Load on braced frames
1 wg=0,0,-.1667      :100 psf---T1
C       Slab load on braced frames
2 wg=0,0,-.08333     :150pcfx4 in. ---T1
C        Roof Dead Loads
3 wg=0,0,-.005
C        Roof Live Loads
4 wg=0,0,-.033333
```

```
C       Wind Span Loads
5 wg=.09667,0,0
6 wg=.101667,0,0
7 wg=.006667,0,0
8 wg=-.02333,0,0
9 wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
14 wg=-.09667,0,0
15 wg=-.101667,0,0
16 wg=-.006667,0,0
17 wg=.02333,0,0
18 wg=-.12,0,0
C         Truss Elements T1-b
588  525  575  m=42 lp=2,0
C              Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=2,0 lr=1,0,0,0,0,0
552  503  505  m=3  lp=2,0
553  505  507  m=3  lp=2,0
554  507  509  m=3  lp=2,0
555  509  511  m=11 lp=2,0
556  511  513  m=11 lp=2,0
557  513  515  m=11 lp=2,0
558  515  517  m=11 lp=2,0
559  517  519  m=3  lp=2,0
560  519  521  m=3  lp=2,0
561  521  523  m=3  lp=2,0
562  523  525  m=3  lp=2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=2,0
565  529  531  m=3  lp=2,0
566  531  533  m=3  lp=2,0
567  533  535  m=11 lp=2,0
568  535  537  m=11 lp=2,0
569  537  539  m=11 lp=2,0
570  539  541  m=11 lp=2,0
571  541  543  m=3  lp=2,0
572  543  545  m=3  lp=2,0
573  545  547  m=3  lp=2,0
574  547  549  m=3  lp=2,0     lr=0,1,0,0,0,0
C             Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0     lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0     lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0     lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0     lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0     lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0     lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0    lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0    lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0    lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0    lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0    lr=0,1,0,0,0,0
723  624  523  m=16 lp=-2,0    lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0     lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0     lr=0,1,0,0,0,0
```

```
730  630  531  m=13 lp=2,0      lr=0,1,0,0,0,0
732  632  533  m=8  lp=2,0      lr=0,1,0,0,0,0
734  634  535  m=10 lp=2,0      lr=0,1,0,0,0,0
736  636  537  m=13 lp=2,0      lr=0,1,0,0,0,0
737  638  537  m=13 lp=-2,0     lr=0,1,0,0,0,0
739  640  539  m=10 lp=-2,0     lr=0,1,0,0,0,0
741  642  541  m=9  lp=-2,0     lr=0,1,0,0,0,0
743  644  543  m=8  lp=-2,0     lr=0,1,0,0,0,0
745  646  545  m=7  lp=-2,0     lr=0,1,0,0,0,0
747  648  547  m=4  lp=-2,0     lr=0,1,0,0,0,0
C             Main Diagonal Top section
701  551  602  m=4  lp=2,0      lr=1,0,0,0,0,0
703  553  604  m=7  lp=2,0      lr=1,0,0,0,0,0
705  555  606  m=8  lp=2,0      lr=1,0,0,0,0,0
707  557  608  m=9  lp=2,0      lr=1,0,0,0,0,0
709  559  610  m=10 lp=2,0      lr=1,0,0,0,0,0
711  561  612  m=13 lp=2,0      lr=1,0,0,0,0,0
714  565  614  m=13 lp=-2,0     lr=1,0,0,0,0,0
716  567  616  m=10 lp=-2,0     lr=1,0,0,0,0,0
718  569  618  m=8  lp=-2,0     lr=1,0,0,0,0,0
720  571  620  m=13 lp=-2,0     lr=1,0,0,0,0,0
722  573  622  m=15 lp=-2,0     lr=1,0,0,0,0,0
724  575  624  m=16 lp=-2,0     lr=1,0,0,0,0,0
725  575  626  m=16 lp=2,0      lr=1,0,0,0,0,0
727  577  628  m=15 lp=2,0       lr=1,0,0,0,0,0
729  579  630  m=13 lp=2,0       lr=1,0,0,0,0,0
731  581  632  m=8  lp=2,0       lr=1,0,0,0,0,0
733  583  634  m=10 lp=2,0       lr=1,0,0,0,0,0
735  585  636  m=13 lp=2,0       lr=1,0,0,0,0,0
738  589  638  m=13 lp=-2,0      lr=1,0,0,0,0,0
740  591  640  m=10 lp=-2,0      lr=1,0,0,0,0,0
742  593  642  m=9  lp=-2,0      lr=1,0,0,0,0,0
744  595  644  m=8  lp=-2,0      lr=1,0,0,0,0,0
746  597  646  m=7  lp=-2,0      lr=1,0,0,0,0,0
748  599  648  m=4  lp=-2,0      lr=1,0,0,0,0,0
C             Diagonal Brace
626  553  602  m=5  lp=2,0       lr=1,1,0,0,0,0
627  555  604  m=5  lp=2,0       lr=1,1,0,0,0,0
628  557  606  m=5  lp=2,0       lr=1,1,0,0,0,0
629  559  608  m=5  lp=2,0       lr=1,1,0,0,0,0
630  561  610  m=5  lp=2,0       lr=1,1,0,0,0,0
631  563  612  m=5  lp=2,0       lr=1,1,0,0,0,0
632  563  614  m=5  lp=-2,0      lr=1,1,0,0,0,0
633  565  616  m=5  lp=-2,0      lr=1,1,0,0,0,0
634  567  618  m=5  lp=-2,0      lr=1,1,0,0,0,0
635  569  620  m=5  lp=-2,0      lr=1,1,0,0,0,0
636  571  622  m=5  lp=-2,0      lr=1,1,0,0,0,0
637  573  624  m=5  lp=-2,0      lr=1,1,0,0,0,0
638  577  626  m=5  lp=2,0       lr=1,1,0,0,0,0
639  579  628  m=5  lp=2,0       lr=1,1,0,0,0,0
640  581  630  m=5  lp=2,0       lr=1,1,0,0,0,0
641  583  632  m=5  lp=2,0       lr=1,1,0,0,0,0
642  585  634  m=5  lp=2,0       lr=1,1,0,0,0,0
643  587  636  m=5  lp=2,0       lr=1,1,0,0,0,0
644  587  638  m=5  lp=-2,0      lr=1,1,0,0,0,0
645  589  640  m=5  lp=-2,0      lr=1,1,0,0,0,0
646  591  642  m=5  lp=-2,0      lr=1,1,0,0,0,0
```

```
647  593  644  m=5  lp=-2,0     lr=1,1,0,0,0,0
648  595  646  m=5  lp=-2,0     lr=1,1,0,0,0,0
649  597  648  m=5  lp=-2,0     lr=1,1,0,0,0,0
C             Vertical Brace
601  602  552  m=5  lp=2,0      lr=1,1,0,0,0,0
602  604  554  m=5  lp=2,0      lr=1,1,0,0,0,0
603  606  556  m=5  lp=2,0      lr=1,1,0,0,0,0
604  608  558  m=5  lp=2,0      lr=1,1,0,0,0,0
605  610  560  m=5  lp=2,0      lr=1,1,0,0,0,0
606  612  562  m=5  lp=2,0      lr=1,1,0,0,0,0
607  614  564  m=5  lp=2,0      lr=1,1,0,0,0,0
608  616  566  m=5  lp=2,0      lr=1,1,0,0,0,0
609  618  568  m=5  lp=2,0      lr=1,1,0,0,0,0
610  620  570  m=5  lp=2,0      lr=1,1,0,0,0,0
611  622  572  m=5  lp=2,0      lr=1,1,0,0,0,0
612  624  574  m=5  lp=2,0      lr=1,1,0,0,0,0
613  626  576  m=5  lp=-2,0     lr=1,1,0,0,0,0
614  628  578  m=5  lp=-2,0     lr=1,1,0,0,0,0
615  630  580  m=5  lp=-2,0     lr=1,1,0,0,0,0
616  632  582  m=5  lp=-2,0     lr=1,1,0,0,0,0
617  634  584  m=5  lp=-2,0     lr=1,1,0,0,0,0
618  636  586  m=5  lp=-2,0     lr=1,1,0,0,0,0
619  638  588  m=5  lp=-2,0     lr=1,1,0,0,0,0
620  640  590  m=5  lp=-2,0     lr=1,1,0,0,0,0
621  642  592  m=5  lp=-2,0     lr=1,1,0,0,0,0
622  644  594  m=5  lp=-2,0     lr=1,1,0,0,0,0
623  646  596  m=5  lp=-2,0     lr=1,1,0,0,0,0
624  648  598  m=5  lp=-2,0     lr=1,1,0,0,0,0
C              Top Chord (3 axis ------)
501  551  552  m=2  lp=-2,0    lr=1,0,0,0,0,0
502  552  553  m=2  lp=-2,0
503  553  554  m=2  lp=-2,0
504  554  555  m=2  lp=-2,0
505  555  556  m=2  lp=-2,0
506  556  557  m=2  lp=-2,0
507  557  558  m=2  lp=-2,0
508  558  559  m=2  lp=-2,0
509  559  560  m=12 lp=-2,0
510  560  561  m=12 lp=-2,0
511  561  562  m=12 lp=-2,0
512  562  563  m=12 lp=-2,0
513  563  564  m=12 lp=-2,0
514  564  565  m=12 lp=-2,0
515  565  566  m=12 lp=-2,0
516  566  567  m=12 lp=-2,0
517  567  568  m=2  lp=-2,0
518  568  569  m=2  lp=-2,0
519  569  570  m=2  lp=-2,0
520  570  571  m=2  lp=-2,0
521  571  572  m=2  lp=-2,0
522  572  573  m=2  lp=-2,0
523  573  574  m=2  lp=-2,0
524  574  575  m=2  lp=-2,0    lr=0,1,0,0,0,0
525  575  576  m=2  lp=-2,0    lr=1,0,0,0,0,0
526  576  577  m=2  lp=-2,0
527  577  578  m=2  lp=-2,0
528  578  579  m=2  lp=-2,0
```

```
529  579  580  m=2  lp=-2,0
530  580  581  m=2  lp=-2,0
531  581  582  m=2  lp=-2,0
532  582  583  m=2  lp=-2,0
533  583  584  m=12 lp=-2,0
534  584  585  m=12 lp=-2,0
535  585  586  m=12 lp=-2,0
536  586  587  m=12 lp=-2,0
537  587  588  m=12 lp=-2,0
538  588  589  m=12 lp=-2,0
539  589  590  m=12 lp=-2,0
540  590  591  m=12 lp=-2,0
541  591  592  m=2  lp=-2,0
542  592  593  m=2  lp=-2,0
543  593  594  m=2  lp=-2,0
544  594  595  m=2  lp=-2,0
545  595  596  m=2  lp=-2,0
546  596  597  m=2  lp=-2,0
547  597  598  m=2  lp=-2,0
548  598  599  m=2  lp=-2,0      lr=0,1,0,0,0,0
C                South Vertical Member
576  501  551  m=1  lp=2,0 nsl=0,0,6,8,0,0,0,10,12,0,16,18 \
                                lr=1,1,0,0,0,0
577  503  553  m=6  lp=2,0      lr=1,1,0,0,0,0
578  505  555  m=6  lp=2,0      lr=1,1,0,0,0,0
579  507  557  m=6  lp=2,0      lr=1,1,0,0,0,0
580  509  559  m=6  lp=2,0      lr=1,1,0,0,0,0
581  511  561  m=6  lp=2,0      lr=1,1,0,0,0,0
582  513  563  m=6  lp=2,0      lr=1,1,0,0,0,0
583  515  565  m=6  lp=2,0      lr=1,1,0,0,0,0
584  517  567  m=6  lp=2,0      lr=1,1,0,0,0,0
585  519  569  m=6  lp=2,0      lr=1,1,0,0,0,0
586  521  571  m=14 lp=2,0      lr=1,1,0,0,0,0
587  523  573  m=14 lp=2,0      lr=1,1,0,0,0,0
589  527  577  m=14 lp=-2,0     lr=1,1,0,0,0,0
590  529  579  m=14 lp=-2,0     lr=1,1,0,0,0,0
591  531  581  m=6  lp=-2,0     lr=1,1,0,0,0,0
592  533  583  m=6  lp=-2,0     lr=1,1,0,0,0,0
593  535  585  m=6  lp=-2,0     lr=1,1,0,0,0,0
594  537  587  m=6  lp=-2,0     lr=1,1,0,0,0,0
595  539  589  m=6  lp=-2,0     lr=1,1,0,0,0,0
596  541  591  m=6  lp=-2,0     lr=1,1,0,0,0,0
597  543  593  m=6  lp=-2,0     lr=1,1,0,0,0,0
598  545  595  m=6  lp=-2,0     lr=1,1,0,0,0,0
599  547  597  m=6  lp=-2,0     lr=1,1,0,0,0,0
600 549 599 m=1 lp=2,0 nsl=0,0,7,9,0,0,0,11,13,0,15,17 \
                                lr=1,1,0,0,0,0
C      Bracing Frame Elements
820  667  998  m=1  lp=2,0   nsl=0,0,5,8,0,0,0,10,12,0,16,18
823  998  501  m=1  lp=2,0   nsl=0,0,5,8,0,0,0,10,12,0,16,18
835  674  675  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
836  675  676  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
837  676  677  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
838  677  678  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
859  679  680  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
860  680  681  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
861  681  682  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
```

```
862  682  683  m=18 lp=2,0        nsl=2,1,0,0,0,0,0,0,0,0,0,0
867  686  683  m=20 lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17
868  683  678  m=20 lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17
871  685  679  m=1  lp=2,0
872  679  999  m=1  lp=2,0
874  999  674  m=1  lp=2,0
873  674  549  m=1  lp=2,0    nsl=0,0,7,9,0,0,0,11,13,0,15,17
C
C   Knee Braces
998  998  503  m=57 lp=2,0
999  999  547  m=57 lp=2,0

loads
C Dead Loads
551 599 48  l=1 f=0,0,-.752
552 554  1  l=1 f=0,0,-1.474
555         l=1 f=0,0,-1.664
556 558 1   l=1 f=0,0,-1.474
559         l=1 f=0,0,-1.664
560 562 1   l=1 f=0,0,-1.474
563         l=1 f=0,0,-1.904
564 566 1   l=1 f=0,0,-1.474
567         l=1 f=0,0,-1.664
568 570 1   l=1 f=0,0,-1.474
571         l=1 f=0,0,-1.664
572 574 1   l=1 f=0,0,-1.474
575         l=1 f=0,0,-2.920
576 578 1   l=1 f=0,0,-1.474
579         l=1 f=0,0,-1.664
580 582 1   l=1 f=0,0,-1.474
583         l=1 f=0,0,-1.664
584 586 1   l=1 f=0,0,-1.474
587         l=1 f=0,0,-1.904
588 590 1   l=1 f=0,0,-1.474
591         l=1 f=0,0,-1.664
592 594 1   l=1 f=0,0,-1.474
595         l=1 f=0,0,-1.664
596 598 1   l=1 f=0,0,-1.474
551 599 48  l=1 f=0,0,-.347
555 559 4   l=1 f=0,0,-.557
563 587 24  l=1 f=0,0,-.322
567 571 4   l=1 f=0,0,-.557
575         l=1 f=0,0,-.163
579 583 4   l=1 f=0,0,-.557
591 595 4   l=1 f=0,0,-.557
509 517 8   l=1 f=0,0,-.355
533 541 8   l=1 f=0,0,-.355
C Live Loads
501 549 48  l=2 f=0,0,-1.066
503 523 2   l=2 f=0,0,-2.133
C Wind I
557        l=3 f=4,0,0
551        l=3 f=0,0,1.73
552 557 1  l=3 f=0,0,3.47
558        l=3 f=0,0,1.67
559 564 1  l=3 f=0,0,1.06
565 598 1  l=3 f=0,0,-.4
```

```
599         l=3 f=0,0,-.2
C Wind II
557         l=4 f=-.9,0,0
551         l=4 f=0,0,6.27
552 557 1   l=4 f=0,0,12.53
558         l=4 f=0,0,10.73
559 564 1   l=4 f=0,0,10.13
565 598 1   l=4 f=0,0,8.67
599         l=4 f=0,0,4.33
C Point Loads
503 523 2    l=5 f=0,0,-.5
527 547 2    l=5 f=0,0,-.5
C Roof Live Loads
551 599 48   l=6 f=0,0,-1.3333
552 598 1    l=6 f=0,0,-2.66667
C Crane Dead Loads for Down Force
527 547 20   l=7 f=0,0,-2.6
529 545 4    l=7 f=0,0,-2.6
527 547 20   l=7 f=0,0,-.773
529 545 16   l=7 f=0,0,-1.6
533 541 8    l=7 f=0,0,-2.134
505 523 18   l=7 f=0,0,-.552
511 517 6    l=7 f=0,0,-.960
C Wind III
551          l=8 f=0,0,.338
552 598 1    l=8 f=0,0,.675
599          l=8 f=0,0,.338
C Wind IV
551          l=9 f=0,0,4.86
552 598 1    l=9 f=0,0,9.72
599          l=9 f=0,0,4.86
C Crane Dead Loads for Uplift
505 523 6    l=10 f=0,0,-.333
527 545 6    l=10 f=0,0,-.333
C Wind I - Reverse Direction
593          l=11 f=-4,0,0
599          l=11 f=0,0,1.73
593 598 1    l=11 f=0,0,3.47
592          l=11 f=0,0,1.67
586 591 1    l=11 f=0,0,1.06
552 585 1    l=11 f=0,0,-.4
551          l=11 f=0,0,-.2
C Wind II - Reverse Direction
593          l=12 f=.9,0,0
599          l=12 f=0,0,6.27
593 598 1    l=12 f=0,0,12.53
592          l=12 f=0,0,10.73
586 591 1    l=12 f=0,0,10.13
552 585 1    l=12 f=0,0,8.67
551          l=12 f=0,0,4.33
```

Truss T1 Hangars 44 and 45 Knee Braces Average Wind

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,0,0,0,1,0,0
2 c=1,0,0,1,1,0,0,0,0,1,0,0
3 c=1,0,0,0,1,0,0,1,0,1,0,0
4 c=1,0,0,0,1,0,0,0,1,1,0,0
5 c=1,0,0,0,1,0,0,0,0,1,1,0
6 c=1,0,0,0,1,0,0,0,0,1,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375          :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8         :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0             :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625     :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625     :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625     :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625     :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625     :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38             :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38               :2L8x8x1/2

frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
```

```
729 730 1 m=64
735 738 1 m=64
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
835 838 1 l=1,.001
859 862 1 l=1,.001
820       l=1,.001
871       l=1,.001
867 868 1 l=1,.001
998 999 1 m=72
```

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 22
SAP90_FILE:t1-44k/SAPSTL_FILE:asd.STL

Truss T1 Hangars 44 and 45 Knee braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
502	T	(T)	.608	.154	.454	.000	80.02	2	(H2-1)	NON-COM
503	T	(T)	.810	.331	.479	.000	80.02	2	(H2-1)	NON-COM
504	T	(T)	.809	.331	.479	.000	.00	2	(H2-1)	NON-COM
505	T	(T)	.833	.448	.386	.000	80.02	2	(H2-1)	NON-COM
506	T	(T)	.833	.447	.386	.000	.00	2	(H2-1)	NON-COM
507	T	(T)	.816	.489	.327	.000	80.02	4	(H2-1)	NON-COM
508	T	(T)	.815	.489	.327	.000	.00	4	(H2-1)	NON-COM
509	T	(T)	.745	.513	.232	.000	80.02	4	(H2-1)	NON-COM
510	T	(T)	.745	.512	.232	.000	.00	4	(H2-1)	NON-COM
511	T	(T)	.653	.492	.161	.000	80.02	4	(H2-1)	NON-COM
512	T	(T)	.653	.492	.161	.000	.00	4	(H2-1)	NON-COM
513	T	(T)	.746	.490	.256	.000	80.02	4	(H2-1)	NON-COM
514	T	(T)	.746	.490	.256	.000	.00	4	(H2-1)	NON-COM
515	T	(T)	.806	.427	.379	.000	80.02	4	(H2-1)	NON-COM
516	T	(T)	.806	.427	.379	.000	.00	4	(H2-1)	NON-COM
517	T	(T)	.739	.327	.412	.000	80.02	4	(H2-1)	NON-COM
518	T	(T)	.739	.326	.412	.000	.00	4	(H2-1)	NON-COM
519	T	(T)	.607	.193	.414	.000	80.02	4	(H2-1)	NON-COM
520	T	(T)	.607	.193	.414	.000	.00	4	(H2-1)	NON-COM
522	T	(C)	.506	.069	.437	.000	80.02	2	(H1-3)	NON-COM
523	T	(C)	.736	.283	.453	.000	.00	2	(H1-1)	NON-COM
524	T	(C)	.585	.283	.302	.000	.00	2	(H1-1)	NON-COM
525	T	(C)	.581	.298	.283	.000	80.02	2	(H1-1)	NON-COM
526	T	(C)	.723	.298	.425	.000	80.02	2	(H1-1)	NON-COM
527	T									NON-COM

(C)	.508	.099	.409	.000	.00	2	(H1-3)

Truss T1 Hangars 44 and 45 Knee braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
529	T	(T)	.605	.192	.414	.000	80.02	4	(H2-1)	NON-COM
530	T	(T)	.606	.192	.414	.000	.00	4	(H2-1)	NON-COM
531	T	(T)	.737	.325	.412	.000	80.02	4	(H2-1)	NON-COM
532	T	(T)	.737	.326	.412	.000	.00	4	(H2-1)	NON-COM
533	T	(T)	.803	.425	.378	.000	80.02	4	(H2-1)	NON-COM
534	T	(T)	.804	.426	.378	.000	.00	4	(H2-1)	NON-COM
535	T	(T)	.749	.480	.270	.000	80.02	6	(H2-1)	NON-COM
536	T	(T)	.750	.480	.270	.000	.00	6	(H2-1)	NON-COM
537	T	(T)	.651	.490	.161	.000	80.02	4	(H2-1)	NON-COM
538	T	(T)	.651	.490	.161	.000	.00	4	(H2-1)	NON-COM
539	T	(T)	.743	.510	.233	.000	80.02	4	(H2-1)	NON-COM
540	T	(T)	.743	.510	.233	.000	.00	4	(H2-1)	NON-COM
541	T	(T)	.822	.497	.325	.000	80.02	6	(H2-1)	NON-COM
542	T	(T)	.822	.497	.325	.000	.00	6	(H2-1)	NON-COM
543	T	(T)	.844	.434	.410	.000	80.02	6	(H2-1)	NON-COM
544	T	(T)	.845	.434	.410	.000	.00	6	(H2-1)	NON-COM
545	T	(T)	.808	.306	.503	.000	80.02	6	(H2-1)	NON-COM
546	T	(T)	.809	.306	.503	.000	80.02	6	(H2-1)	NON-COM
547	T	(T)	.621	.118	.503	.000	.00	6	(H2-1)	NON-COM
553	G	(C)	.683	.557	.125	.000	160.00	2	(H1-1)	NON-COM
554	G	(C)	1.046	.815	.231	.000	160.00	2	(H1-1)	NON-COM
555	T	(C)	.858	.707	.151	.000	.00	2	(H1-1)	NON-COM
556	T	(C)	.879	.712	.167	.000	160.00	2	(H1-1)	NON-COM
557	T	(C)	.630	.499	.131	.000	160.00	2	(H1-1)	NON-COM
561	G	(T)	.681	.620	.061	.000	.00	4	(H2-1)	NON-COM

Truss T1 Hangars 44 and 45 Knee braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS = RATIO	AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
562	G									NON-COM
		(C)	.687	.587	.100	.000	.00	1	(H1-1)	
		(T)	1.035	.983	.052	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.690	.587	.104	.000	160.00	1	(H1-1)	
		(T)	1.035	.983	.052	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.681	.620	.061	.000	160.00	4	(H2-1)	
568	T									NON-COM
		(C)	.525	.407	.118	.000	160.00	6	(H1-1)	
569	T									NON-COM
		(C)	.729	.584	.144	.000	.00	6	(H1-1)	
570	T									NON-COM
		(C)	.684	.560	.124	.000	160.00	6	(H1-1)	
571	G									NON-COM
		(C)	.799	.642	.157	.000	.00	2	(H1-1)	
572	G									NON-COM
		(C)	.579	.468	.111	.000	160.00	2	(H1-1)	
577	G									NON-COM
		(C)	.885	.885	.000	.000	.00	5	(H1-1)	
		(T)	.624	.624	.000	.000	.00	2	(H2-1)	
578	G			kl/r > 200						NON-COM
		(C)	1.257	1.257	.000	.000	.00	5	(H1-1)	
579	G			kl/r > 200						NON-COM
		(C)	1.099	1.099	.000	.000	.00	5	(H1-1)	
580	G			kl/r > 200						NON-COM
		(C)	.673	.673	.000	.000	.00	5	(H1-1)	
581	G			kl/r > 200						NON-COM
582	G			kl/r > 200						NON-COM
583	G			kl/r > 200						NON-COM
		(C)	1.003	1.003	.000	.000	.00	5	(H1-1)	
584	G			kl/r > 200						NON-COM
		(C)	1.707	1.707	.000	.000	.00	5	(H1-1)	
585	G			kl/r > 200						NON-COM
		(C)	1.569	1.569	.000	.000	.00	5	(H1-1)	
		(T)	.500	.500	.000	.000	.00	2	(H2-1)	
586	G			kl/r > 200						NON-COM
		(C)	1.475	1.475	.000	.000	.00	5	(H1-1)	
587	G			kl/r > 200						NON-COM
		(C)	1.483	1.483	.000	.000	.00	5	(H1-1)	
		(T)	.557	.557	.000	.000	.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.261	1.261	.000	.000	.00	1	(H1-1)	
		(T)	.556	.556	.000	.000	.00	4	(H2-1)	
590	G			kl/r > 200						NON-COM
		(C)	1.242	1.242	.000	.000	.00	1	(H1-1)	
591	G			kl/r > 200						NON-COM
		(C)	1.307	1.307	.000	.000	.00	1	(H1-1)	
592	G			kl/r > 200						NON-COM
		(C)	1.368	1.368	.000	.000	.00	1	(H1-1)	

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Truss T1 Hangars 44 and 45 Knee braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
593	G		kl/r > 200							NON-COM
		(C)	.826	.826	.000	.000	.00	3	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
		(C)	.890	.890	.000	.000	.00	1	(H1-1)	
597	G		kl/r > 200							NON-COM
		(C)	1.282	1.282	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.375	1.375	.000	.000	.00	1	(H1-1)	
599	G									NON-COM
		(C)	.966	.966	.000	.000	.00	1	(H1-1)	
		(T)	.654	.654	.000	.000	.00	6	(H2-1)	
701	T									NON-COM
		(C)	.885	.805	.080	.000	113.14	2	(H1-1)	
702	T									NON-COM
		(C)	.829	.752	.077	.000	.00	2	(H1-1)	
703	T									NON-COM
		(C)	1.421	1.308	.114	.000	114.32	2	(H1-1)	
704	T									NON-COM
		(C)	1.383	1.272	.110	.000	.00	2	(H1-1)	
705	T		fa > Fe							NON-COM
706	T									NON-COM
		(C)	8.023	1.310	6.713	.000	.00	4	(H1-1)	
707	T									NON-COM
		(C)	2.300	.941	1.359	.000	116.73	4	(H1-1)	
708	T									NON-COM
		(C)	1.519	.876	.643	.000	.00	4	(H1-1)	
709	2L3X2X5/16-3									NON-COM
		(C)	.601	.474	.127	.000	117.95	4	(H1-1)	
713	T									NON-COM
		(C)	.899	.694	.204	.000	.00	2	(H1-1)	
714	T									NON-COM
		(C)	.979	.753	.226	.000	121.67	2	(H1-1)	
715	T		fa > Fe							NON-COM
716	T		fa > Fe							NON-COM
717	T		fa > Fe							NON-COM
718	T		fa > Fe							NON-COM
719	T		fa > Fe							NON-COM
720	T		fa > Fe							NON-COM
721	T									NON-COM
		(C)	2.394	1.777	.617	.000	.00	4	(H1-1)	
722	T									NON-COM
		(C)	2.394	1.777	.617	.000	126.77	4	(H1-1)	
723	T									NON-COM
		(C)	3.248	1.592	1.656	.000	.00	4	(H1-1)	
		(T)	.514	.471	.043	.000	32.02	5	(H2-1)	
724	T									NON-COM
		(C)	3.613	1.619	1.994	.000	128.06	4	(H1-1)	
		(T)	.517	.474	.043	.000	96.05	5	(H2-1)	

Truss T1 Hangars 44 and 45 Knee braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
725	T	(C)	3.580	1.617	1.963	.000	128.06	4	(H1-1)	NON-COM
726	T	(C)	3.223	1.590	1.633	.000	.00	4	(H1-1)	NON-COM
727	T	(C)	2.388	1.774	.613	.000	126.77	4	(H1-1)	NON-COM
728	T	(C)	2.387	1.774	.613	.000	.00	4	(H1-1)	NON-COM
729	T			fa > Fe						NON-COM
730	T			fa > Fe						NON-COM
731	T			fa > Fe						NON-COM
732	T			fa > Fe						NON-COM
733	T			fa > Fe						NON-COM
734	T			fa > Fe						NON-COM
735	T	(C)	.860	.669	.191	.000	121.67	6	(H1-1)	NON-COM
736	T	(C)	.784	.609	.175	.000	.00	6	(H1-1)	NON-COM
740	2L3X2X5/16-3	(C)	.608	.480	.128	.000	117.95	4	(H1-1)	NON-COM
741	T	(C)	1.552	.881	.671	.000	.00	4	(H1-1)	NON-COM
742	T	(C)	2.430	.946	1.484	.000	116.73	4	(H1-1)	NON-COM
743	T			fa > Fe						NON-COM
744	T			fa > Fe						NON-COM
745	T	(C)	1.477	1.355	.122	.000	.00	6	(H1-1)	NON-COM
746	T	(C)	1.509	1.384	.125	.000	114.32	6	(H1-1)	NON-COM
747	T	(C)	.827	.759	.069	.000	.00	2	(H1-1)	NON-COM
748	T	(C)	.857	.787	.070	.000	113.14	2	(H1-1)	NON-COM
820	W18X76	(C)	.984	.085	.899	.000	289.00	5	(H1-3)	COMPACT
		(T)	1.330	.174	1.156	.000	289.00	2	(H2-1)	
823	W18X76	(C)	.877	.023	.853	.000	.00	5	(H1-3)	COMPACT
		(T)	1.200	.101	1.099	.000	.00	2	(H2-1)	
835	W18X46	(C)	.529	.013	.516	.000	.00	2	(H1-3)	COMPACT
838	W18X46	(C)	.523	.013	.510	.000	78.00	2	(H1-3)	COMPACT
859	W24X68	(C)	1.362	.013	1.349	.000	.00	5	(H1-3)	COMPACT
		(T)	1.288	.057	1.230	.000	.00	6	(H2-1)	
860	W24X68	(C)	.746	.029	.717	.000	.00	1	(H1-3)	COMPACT
		(T)	.571	.057	.514	.000	.00	6	(H2-1)	

Truss T1 Hangars 44 and 45 Knee braces Avg. Wind

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AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
861	W24X68									COMPACT
		(C)	.608	.013	.595	.000	78.00	5	(H1-3)	
		(T)	.532	.057	.475	.000	78.00	6	(H2-1)	
862	W24X68									COMPACT
		(C)	1.273	.029	1.244	.000	78.00	1	(H1-3)	
		(T)	1.054	.046	1.009	.000	78.00	2	(H2-1)	
867	W18X65									COMPACT
		(C)	1.545	.121	1.424	.000	180.50	1	(H1-3)	
		(T)	1.199	.015	1.184	.000	180.50	6	(H2-1)	
871	W18X76									COMPACT
		(C)	1.374	.112	1.261	.000	180.50	5	(H1-3)	
		(T)	1.077	.102	.976	.000	180.50	6	(H2-1)	
872	W18X76									COMPACT
		(C)	.910	.090	.820	.000	108.50	1	(H1-3)	
		(T)	1.219	.181	1.038	.000	108.50	6	(H2-1)	
873	W18X76									COMPACT
		(T)	.568	.079	.489	.000	.00	6	(H2-1)	
874	W18X76									COMPACT
		(C)	.782	.001	.781	.000	.00	1	(H1-3)	
		(T)	1.062	.077	.985	.000	.00	6	(H2-1)	
998	G									NON-COM
		(C)	.688	.193	.495	.000	.00	5	(H1-1)	
		(T)	.762	.205	.557	.000	.00	2	(H2-1)	
999	G									NON-COM
		(C)	.751	.288	.463	.000	.00	1	(H1-1)	
		(T)	.800	.289	.511	.000	.00	6	(H2-1)	

Truss T1 Hangars 44 and 45 Knee Braces Maximum Wind

C SAP90 INPUT

```
system
L=12
C
C
C
joints
C      Truss Joints T1
501  x=0     z=0           y=240
549  x=3840  z=0           y=240 g=501,549,2
551  x=0     z=160         y=240
575  x=1920  z=200         y=240 g=551,575,1
599  x=3840  z=160         y=240 g=575,599,1
602  x=80    z=80
612  x=880   z=88.333            g=602,612,2
614  x=1040  z=91.6667     y=240
624  x=1840  z=100         y=240 g=614,624,2
626  x=2000  z=100         y=240
636  x=2800  z=91.6667     y=240 g=626,636,2
638  x=2960  z=88.3333     y=240
648  x=3760  z=80          y=240 g=638,648,2
C      Bracing Frame Joints T1
667  x=0     z=-384    y=240
674  x=3840  z=-43     y=240
678  x=4152  z=-43     y=240 g=674,678,1
679  x=3840  z=-203.5  y=240
683  x=4152  z=-203.5  y=240 g=679,683,1
685  x=3840  z=-384    y=240
686  x=4152  z=-384    y=240
998  x=0     z=-95     y=240
999  x=3840  z=-95     y=240

restraints
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
nm=57 nl=18 z=-1,0,0,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333   E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
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9   sh=213x2.5x1/4-3      w=.00075
10  sh=213x2x5/16-3       w=.0008333
11  sh=216x6x1/2-3        w=.0030667
12  sh=218x6x1/2-3        w=.0038333
13  sh=214x3x5/16-3       w=.0012
14  sh=216x4x3/8-3        w=.00205
15  sh=215x3x1/4-3        w=.0011
16  sh=215x3.5x5/16-3     w=.00145
17  sh=w18x65             w=.00541667
18  sh=w24x68             w=.005667
19  sh=w18x46             w=.0038333
20  sh=w18x65             w=.00541667
21  sh=216x6x5/8-3        w=.0040333
22  sh=213x2.5x1/4-3      w=.00075
23  sh=w8x18              w=.0015
24  sh=w12x22             w=.0018333
25  sh=w10x22             w=.0018333
26  sh=w14x30             w=.0025
27  sh=w8x31              w=.00258333
28  sh=w12x26             w=.0021667
29  sh=w10x12             w=.001
30  sh=w10x22             w=.0018333
31  sh=14x3x1/4           w=.00048333
32  sh=13.5x2.5x1/4       w=.000408333
33  sh=215x3.5x3/8-3      w=.0017333
34  sh=w14x90             w=.0075
35  sh=w14x145            w=.01208333
36  sh=w33x201            w=.01675
37  sh=217x4x1/2          w=.00298
38  sh=w14x74             w=.0061667
39  sh=w14x43             w=.00358333
40  sh=215x3x5/16         w=.0013667
41  sh=s12x50             w=.0041667
42  sh=w14x61             w=.00508333
43  sh=w6x16              w=.001333
44  sh=213x2.5x1/4-3      w=.00075
45  sh=mc12x31            w=.00258333
46  sh=mc12x31            w=.00258333
47  sh=mc12x31            w=.00258333
48  sh=216x3.5x3/8-3      w=.00195
49  sh=215x3x5/16-3       w=.0013667
50  sh=215x5x3/8          w=.00205
51  sh=13x2.5x1/4         w=.000375
52  sh=13x2x1/4           w=.000341667
53  sh=w14x30             w=.0025
54  sh=215x3.5x5/16-3     w=.00145
55  sh=w14x34             w=.0028333
56  sh=14x3x5/16          w=.0006
57  sh=2L8x8x1/2
C       Live Load on braced frames
1 wg=0,0,-.1667      :100 psf---T1
C       Slab load on braced frames
2 wg=0,0,-.08333     :150pcfx4 in. ---T1
C        Roof Dead Loads
3 wg=0,0,-.005
C        Roof Live Loads
4 wg=0,0,-.033333
```

```
C       Wind Span Loads
5 wg=.09667,0,0
6 wg=.101667,0,0
7 wg=.006667,0,0
8 wg=-.02333,0,0
9 wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
14 wg=-.09667,0,0
15 wg=-.101667,0,0
16 wg=-.006667,0,0
17 wg=.02333,0,0
18 wg=-.12,0,0
C         Truss Elements T1-b
588  525  575  m=42 lp=2,0
C              Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=2,0 lr=1,0,0,0,0,0
552  503  505  m=3  lp=2,0
553  505  507  m=3  lp=2,0
554  507  509  m=3  lp=2,0
555  509  511  m=11 lp=2,0
556  511  513  m=11 lp=2,0
557  513  515  m=11 lp=2,0
558  515  517  m=11 lp=2,0
559  517  519  m=3  lp=2,0
560  519  521  m=3  lp=2,0
561  521  523  m=3  lp=2,0
562  523  525  m=3  lp=2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=2,0
565  529  531  m=3  lp=2,0
566  531  533  m=3  lp=2,0
567  533  535  m=11 lp=2,0
568  535  537  m=11 lp=2,0
569  537  539  m=11 lp=2,0
570  539  541  m=11 lp=2,0
571  541  543  m=3  lp=2,0
572  543  545  m=3  lp=2,0
573  545  547  m=3  lp=2,0
574  547  549  m=3  lp=2,0     lr=0,1,0,0,0,0
C             Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0     lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0     lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0     lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0     lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0     lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0     lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0    lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0    lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0    lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0    lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0    lr=0,1,0,0,0,0
723  624  523  m=16 lp=-2,0    lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0     lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0     lr=0,1,0,0,0,0
```

```
730   630   531   m=13 lp=2,0      lr=0,1,0,0,0,0
732   632   533   m=8  lp=2,0      lr=0,1,0,0,0,0
734   634   535   m=10 lp=2,0      lr=0,1,0,0,0,0
736   636   537   m=13 lp=2,0      lr=0,1,0,0,0,0
737   638   537   m=13 lp=-2,0     lr=0,1,0,0,0,0
739   640   539   m=10 lp=-2,0     lr=0,1,0,0,0,0
741   642   541   m=9  lp=-2,0     lr=0,1,0,0,0,0
743   644   543   m=8  lp=-2,0     lr=0,1,0,0,0,0
745   646   545   m=7  lp=-2,0     lr=0,1,0,0,0,0
747   648   547   m=4  lp=-2,0     lr=0,1,0,0,0,0
C                 Main Diagonal Top section
701   551   602   m=4  lp=2,0      lr=1,0,0,0,0,0
703   553   604   m=7  lp=2,0      lr=1,0,0,0,0,0
705   555   606   m=8  lp=2,0      lr=1,0,0,0,0,0
707   557   608   m=9  lp=2,0      lr=1,0,0,0,0,0
709   559   610   m=10 lp=2,0      lr=1,0,0,0,0,0
711   561   612   m=13 lp=2,0      lr=1,0,0,0,0,0
714   565   614   m=13 lp=-2,0     lr=1,0,0,0,0,0
716   567   616   m=10 lp=-2,0     lr=1,0,0,0,0,0
718   569   618   m=8  lp=-2,0     lr=1,0,0,0,0,0
720   571   620   m=13 lp=-2,0     lr=1,0,0,0,0,0
722   573   622   m=15 lp=-2,0     lr=1,0,0,0,0,0
724   575   624   m=16 lp=-2,0     lr=1,0,0,0,0,0
725   575   626   m=16 lp=2,0      lr=1,0,0,0,0,0
727   577   628   m=15 lp=2,0       lr=1,0,0,0,0,0
729   579   630   m=13 lp=2,0       lr=1,0,0,0,0,0
731   581   632   m=8  lp=2,0       lr=1,0,0,0,0,0
733   583   634   m=10 lp=2,0       lr=1,0,0,0,0,0
735   585   636   m=13 lp=2,0       lr=1,0,0,0,0,0
738   589   638   m=13 lp=-2,0      lr=1,0,0,0,0,0
740   591   640   m=10 lp=-2,0      lr=1,0,0,0,0,0
742   593   642   m=9  lp=-2,0      lr=1,0,0,0,0,0
744   595   644   m=8  lp=-2,0      lr=1,0,0,0,0,0
746   597   646   m=7  lp=-2,0      lr=1,0,0,0,0,0
748   599   648   m=4  lp=-2,0      lr=1,0,0,0,0,0
C                 Diagonal Brace
626   553   602   m=5  lp=2,0       lr=1,1,0,0,0,0
627   555   604   m=5  lp=2,0       lr=1,1,0,0,0,0
628   557   606   m=5  lp=2,0       lr=1,1,0,0,0,0
629   559   608   m=5  lp=2,0       lr=1,1,0,0,0,0
630   561   610   m=5  lp=2,0       lr=1,1,0,0,0,0
631   563   612   m=5  lp=2,0       lr=1,1,0,0,0,0
632   563   614   m=5  lp=-2,0      lr=1,1,0,0,0,0
633   565   616   m=5  lp=-2,0      lr=1,1,0,0,0,0
634   567   618   m=5  lp=-2,0      lr=1,1,0,0,0,0
635   569   620   m=5  lp=-2,0      lr=1,1,0,0,0,0
636   571   622   m=5  lp=-2,0      lr=1,1,0,0,0,0
637   573   624   m=5  lp=-2,0      lr=1,1,0,0,0,0
638   577   626   m=5  lp=2,0       lr=1,1,0,0,0,0
639   579   628   m=5  lp=2,0       lr=1,1,0,0,0,0
640   581   630   m=5  lp=2,0       lr=1,1,0,0,0,0
641   583   632   m=5  lp=2,0       lr=1,1,0,0,0,0
642   585   634   m=5  lp=2,0       lr=1,1,0,0,0,0
643   587   636   m=5  lp=2,0       lr=1,1,0,0,0,0
644   587   638   m=5  lp=-2,0      lr=1,1,0,0,0,0
645   589   640   m=5  lp=-2,0      lr=1,1,0,0,0,0
646   591   642   m=5  lp=-2,0      lr=1,1,0,0,0,0
```

```
647  593  644  m=5  lp=-2,0      lr=1,1,0,0,0,0
648  595  646  m=5  lp=-2,0      lr=1,1,0,0,0,0
649  597  648  m=5  lp=-2,0      lr=1,1,0,0,0,0
C              Vertical Brace
601  602  552  m=5  lp=2,0       lr=1,1,0,0,0,0
602  604  554  m=5  lp=2,0       lr=1,1,0,0,0,0
603  606  556  m=5  lp=2,0       lr=1,1,0,0,0,0
604  608  558  m=5  lp=2,0       lr=1,1,0,0,0,0
605  610  560  m=5  lp=2,0       lr=1,1,0,0,0,0
606  612  562  m=5  lp=2,0       lr=1,1,0,0,0,0
607  614  564  m=5  lp=2,0       lr=1,1,0,0,0,0
608  616  566  m=5  lp=2,0       lr=1,1,0,0,0,0
609  618  568  m=5  lp=2,0       lr=1,1,0,0,0,0
610  620  570  m=5  lp=2,0       lr=1,1,0,0,0,0
611  622  572  m=5  lp=2,0       lr=1,1,0,0,0,0
612  624  574  m=5  lp=2,0       lr=1,1,0,0,0,0
613  626  576  m=5  lp=-2,0      lr=1,1,0,0,0,0
614  628  578  m=5  lp=-2,0      lr=1,1,0,0,0,0
615  630  580  m=5  lp=-2,0      lr=1,1,0,0,0,0
616  632  582  m=5  lp=-2,0      lr=1,1,0,0,0,0
617  634  584  m=5  lp=-2,0      lr=1,1,0,0,0,0
618  636  586  m=5  lp=-2,0      lr=1,1,0,0,0,0
619  638  588  m=5  lp=-2,0      lr=1,1,0,0,0,0
620  640  590  m=5  lp=-2,0      lr=1,1,0,0,0,0
621  642  592  m=5  lp=-2,0      lr=1,1,0,0,0,0
622  644  594  m=5  lp=-2,0      lr=1,1,0,0,0,0
623  646  596  m=5  lp=-2,0      lr=1,1,0,0,0,0
624  648  598  m=5  lp=-2,0      lr=1,1,0,0,0,0
C                   Top Chord (3 axis ------)
501  551  552  m=2  lp=-2,0    lr=1,0,0,0,0,0
502  552  553  m=2  lp=-2,0
503  553  554  m=2  lp=-2,0
504  554  555  m=2  lp=-2,0
505  555  556  m=2  lp=-2,0
506  556  557  m=2  lp=-2,0
507  557  558  m=2  lp=-2,0
508  558  559  m=2  lp=-2,0
509  559  560  m=12 lp=-2,0
510  560  561  m=12 lp=-2,0
511  561  562  m=12 lp=-2,0
512  562  563  m=12 lp=-2,0
513  563  564  m=12 lp=-2,0
514  564  565  m=12 lp=-2,0
515  565  566  m=12 lp=-2,0
516  566  567  m=12 lp=-2,0
517  567  568  m=2  lp=-2,0
518  568  569  m=2  lp=-2,0
519  569  570  m=2  lp=-2,0
520  570  571  m=2  lp=-2,0
521  571  572  m=2  lp=-2,0
522  572  573  m=2  lp=-2,0
523  573  574  m=2  lp=-2,0
524  574  575  m=2  lp=-2,0    lr=0,1,0,0,0,0
525  575  576  m=2  lp=-2,0    lr=1,0,0,0,0,0
526  576  577  m=2  lp=-2,0
527  577  578  m=2  lp=-2,0
528  578  579  m=2  lp=-2,0
```

```
529   579   580   m=2   lp=-2,0
530   580   581   m=2   lp=-2,0
531   581   582   m=2   lp=-2,0
532   582   583   m=2   lp=-2,0
533   583   584   m=12  lp=-2,0
534   584   585   m=12  lp=-2,0
535   585   586   m=12  lp=-2,0
536   586   587   m=12  lp=-2,0
537   587   588   m=12  lp=-2,0
538   588   589   m=12  lp=-2,0
539   589   590   m=12  lp=-2,0
540   590   591   m=12  lp=-2,0
541   591   592   m=2   lp=-2,0
542   592   593   m=2   lp=-2,0
543   593   594   m=2   lp=-2,0
544   594   595   m=2   lp=-2,0
545   595   596   m=2   lp=-2,0
546   596   597   m=2   lp=-2,0
547   597   598   m=2   lp=-2,0
548   598   599   m=2   lp=-2,0      lr=0,1,0,0,0,0
C                 South Vertical Member
576   501   551   m=1   lp=2,0 nsl=0,0,6,8,0,0,0,10,12,0,16,18 \
                                    lr=1,1,0,0,0,0
577   503   553   m=6   lp=2,0       lr=1,1,0,0,0,0
578   505   555   m=6   lp=2,0       lr=1,1,0,0,0,0
579   507   557   m=6   lp=2,0       lr=1,1,0,0,0,0
580   509   559   m=6   lp=2,0       lr=1,1,0,0,0,0
581   511   561   m=6   lp=2,0       lr=1,1,0,0,0,0
582   513   563   m=6   lp=2,0       lr=1,1,0,0,0,0
583   515   565   m=6   lp=2,0       lr=1,1,0,0,0,0
584   517   567   m=6   lp=2,0       lr=1,1,0,0,0,0
585   519   569   m=6   lp=2,0       lr=1,1,0,0,0,0
586   521   571   m=14  lp=2,0       lr=1,1,0,0,0,0
587   523   573   m=14  lp=2,0       lr=1,1,0,0,0,0
589   527   577   m=14  lp=-2,0      lr=1,1,0,0,0,0
590   529   579   m=14  lp=-2,0      lr=1,1,0,0,0,0
591   531   581   m=6   lp=-2,0      lr=1,1,0,0,0,0
592   533   583   m=6   lp=-2,0      lr=1,1,0,0,0,0
593   535   585   m=6   lp=-2,0      lr=1,1,0,0,0,0
594   537   587   m=6   lp=-2,0      lr=1,1,0,0,0,0
595   539   589   m=6   lp=-2,0      lr=1,1,0,0,0,0
596   541   591   m=6   lp=-2,0      lr=1,1,0,0,0,0
597   543   593   m=6   lp=-2,0      lr=1,1,0,0,0,0
598   545   595   m=6   lp=-2,0      lr=1,1,0,0,0,0
599   547   597   m=6   lp=-2,0      lr=1,1,0,0,0,0
600 549 599 m=1 lp=2,0 nsl=0,0,7,9,0,0,0,11,13,0,15,17 \
                                    lr=1,1,0,0,0,0
C       Bracing Frame Elements
820   667   998   m=1   lp=2,0    nsl=0,0,5,8,0,0,0,10,12,0,16,18
823   998   501   m=1   lp=2,0    nsl=0,0,5,8,0,0,0,10,12,0,16,18
835   674   675   m=19  lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
836   675   676   m=19  lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
837   676   677   m=19  lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
838   677   678   m=19  lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0,0,0
859   679   680   m=18  lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
860   680   681   m=18  lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
861   681   682   m=18  lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
```

```
862  682  683  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0,0,0
867  686  683  m=20 lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17
868  683  678  m=20 lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17
871  685  679  m=1  lp=2,0
872  679  999  m=1  lp=2,0
874  999  674  m=1  lp=2,0
873  674  549  m=1  lp=2,0   nsl=0,0,7,9,0,0,0,11,13,0,15,17
C
C   Knee Braces
998  998  503  m=57 lp=2,0
999  999  547  m=57 lp=2,0

loads
C Dead Loads
551 599 48  l=1 f=0,0,-.752
552 554  1  l=1 f=0,0,-1.474
555         l=1 f=0,0,-1.664
556 558 1   l=1 f=0,0,-1.474
559         l=1 f=0,0,-1.664
560 562 1   l=1 f=0,0,-1.474
563         l=1 f=0,0,-1.904
564 566 1   l=1 f=0,0,-1.474
567         l=1 f=0,0,-1.664
568 570 1   l=1 f=0,0,-1.474
571         l=1 f=0,0,-1.664
572 574 1   l=1 f=0,0,-1.474
575         l=1 f=0,0,-2.920
576 578 1   l=1 f=0,0,-1.474
579         l=1 f=0,0,-1.664
580 582 1   l=1 f=0,0,-1.474
583         l=1 f=0,0,-1.664
584 586 1   l=1 f=0,0,-1.474
587         l=1 f=0,0,-1.904
588 590 1   l=1 f=0,0,-1.474
591         l=1 f=0,0,-1.664
592 594 1   l=1 f=0,0,-1.474
595         l=1 f=0,0,-1.664
596 598 1   l=1 f=0,0,-1.474
551 599 48  l=1 f=0,0,-.347
555 559 4   l=1 f=0,0,-.557
563 587 24  l=1 f=0,0,-.322
567 571 4   l=1 f=0,0,-.557
575         l=1 f=0,0,-.163
579 583 4   l=1 f=0,0,-.557
591 595 4   l=1 f=0,0,-.557
509 517 8   l=1 f=0,0,-.355
533 541 8   l=1 f=0,0,-.355
C Live Loads
501 549 48  l=2 f=0,0,-1.066
503 523 2   l=2 f=0,0,-2.133
C Wind I
557        l=3 f=4,0,0
551        l=3 f=0,0,1.73
552 557 1  l=3 f=0,0,3.47
558        l=3 f=0,0,1.67
559 564 1  l=3 f=0,0,1.06
565 598 1  l=3 f=0,0,-.4
```

```
599          l=3 f=0,0,-.2
C Wind II
557          l=4 f=-.9,0,0
551          l=4 f=0,0,6.27
552 557 1    l=4 f=0,0,12.53
558          l=4 f=0,0,10.73
559 564 1    l=4 f=0,0,10.13
565 598 1    l=4 f=0,0,8.67
599          l=4 f=0,0,4.33
C Point Loads
503 523 2    l=5 f=0,0,-.5
527 547 2    l=5 f=0,0,-.5
C Roof Live Loads
551 599 48   l=6 f=0,0,-1.3333
552 598 1    l=6 f=0,0,-2.66667
C Crane Dead Loads for Down Force
527 547 20   l=7 f=0,0,-2.6
529 545 4    l=7 f=0,0,-2.6
527 547 20   l=7 f=0,0,-.773
529 545 16   l=7 f=0,0,-1.6
533 541 8    l=7 f=0,0,-2.134
505 523 18   l=7 f=0,0,-.552
511 517 6    l=7 f=0,0,-.960
C Wind III
551          l=8 f=0,0,1.93
552 557 1    l=8 f=0,0,3.87
558          l=8 f=0,0,3.87
559 564 1    l=8 f=0,0,3.87
565 598 1    l=8 f=0,0,3.87
599          l=8 f=0,0,1.93
C Wind IV
551          l=9 f=0,0,6.4
552 557 1    l=9 f=0,0,12.8
558          l=9 f=0,0,12.8
559 564 1    l=9 f=0,0,12.8
565 598 1    l=9 f=0,0,12.8
599          l=9 f=0,0,6.4
C Crane Dead Loads for Uplift
505 523 6    l=10 f=0,0,-.333
527 545 6    l=10 f=0,0,-.333
C Wind I - Reverse Direction
593          l=11 f=-4,0,0
599          l=11 f=0,0,1.73
593 598 1    l=11 f=0,0,3.47
592          l=11 f=0,0,1.67
586 591 1    l=11 f=0,0,1.06
552 585 1    l=11 f=0,0,-.4
551          l=11 f=0,0,-.2
C Wind II - Reverse Direction
593          l=12 f=.9,0,0
599          l=12 f=0,0,6.27
593 598 1    l=12 f=0,0,12.53
592          l=12 f=0,0,10.73
586 591 1    l=12 f=0,0,10.13
552 585 1    l=12 f=0,0,8.67
551          l=12 f=0,0,4.33
```

Truss T1 Hangars 44 and 45 Knee Braces Maximum Wind

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,1,0,0,0,0,0
2 c=1,0,0,1,1,0,0,0,0,1,0,0
3 c=1,0,0,0,1,0,0,1,0,1,0,0
4 c=1,0,0,0,1,0,0,0,1,1,0,0
5 c=1,0,0,0,1,0,1,0,0,0,1,0
6 c=1,0,0,0,1,0,0,0,0,1,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1         :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375         :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8        :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0            :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5        :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625    :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625    :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625    :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625    :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625    :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1         :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625    :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625    :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38            :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38              :2L8x8x1/2

frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
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729 730 1 m=64
735 738 1 m=64
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
835 838 1 l=1,.001
859 862 1 l=1,.001
820       l=1,.001
871       l=1,.001
867 868 1 l=1,.001
998 999 1 m=72
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C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 22
SAP90_FILE:t1-44k/SAPSTL_FILE:asd.STL
Truss T1 Hangars 44 and 45 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
501	T									NON-COM
		(T)	.611	.217	.394	.000	80.02	4	(H2-1)	
502	T									NON-COM
		(T)	.791	.217	.574	.000	80.02	4	(H2-1)	
503	T									NON-COM
		(T)	1.035	.440	.595	.000	80.02	4	(H2-1)	
504	T									NON-COM
		(T)	1.034	.440	.595	.000	.00	4	(H2-1)	
505	T									NON-COM
		(T)	1.110	.601	.509	.000	80.02	4	(H2-1)	
506	T									NON-COM
		(T)	1.110	.600	.509	.000	.00	4	(H2-1)	
507	T									NON-COM
		(T)	1.131	.690	.442	.000	80.02	4	(H2-1)	
508	T									NON-COM
		(T)	1.131	.689	.442	.000	.00	4	(H2-1)	
509	T									NON-COM
		(T)	1.023	.717	.306	.000	80.02	4	(H2-1)	
510	T									NON-COM
		(T)	1.023	.716	.306	.000	.00	4	(H2-1)	
511	T									NON-COM
		(T)	.890	.680	.209	.000	80.02	4	(H2-1)	
512	T									NON-COM
		(T)	.890	.680	.209	.000	.00	4	(H2-1)	
513	T									NON-COM
		(T)	1.040	.677	.363	.000	80.02	4	(H2-1)	
514	T									NON-COM
		(T)	1.040	.677	.363	.000	.00	4	(H2-1)	
515	T									NON-COM
		(T)	1.121	.579	.542	.000	80.02	4	(H2-1)	
516	T									NON-COM
		(T)	1.121	.578	.542	.000	.00	4	(H2-1)	
517	T									NON-COM
		(T)	1.018	.427	.591	.000	80.02	4	(H2-1)	
518	T									NON-COM
		(T)	1.018	.426	.591	.000	.00	4	(H2-1)	
519	T									NON-COM
		(T)	.816	.226	.590	.000	80.02	4	(H2-1)	
520	T									NON-COM
		(T)	.816	.226	.590	.000	.00	4	(H2-1)	
521	T									NON-COM
		(C)	.679	.029	.649	.000	80.02	4	(H1-3)	
522	T									NON-COM
		(C)	.708	.030	.677	.000	80.02	4	(H1-3)	
523	T									NON-COM
		(C)	1.059	.350	.709	.000	.00	4	(H1-1)	
524	T									NON-COM
		(C)	.830	.350	.479	.000	.00	4	(H1-1)	
525	T									NON-COM

(C)	.830	.351	.478	.000	80.02	4	(H1-1)

Truss T1 Hangars 44 and 45 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
526	T									NON-COM
		(C)	1.058	.351	.707	.000	80.02	4	(H1-1)	
527	T									NON-COM
		(C)	.708	.032	.675	.000	.00	4	(H1-3)	
528	T									NON-COM
		(C)	.679	.032	.647	.000	.00	4	(H1-3)	
529	T									NON-COM
		(T)	.811	.223	.588	.000	80.02	4	(H2-1)	
530	T									NON-COM
		(T)	.811	.223	.588	.000	.00	4	(H2-1)	
531	T									NON-COM
		(T)	1.011	.423	.588	.000	80.02	4	(H2-1)	
532	T									NON-COM
		(T)	1.012	.423	.588	.000	.00	4	(H2-1)	
533	T									NON-COM
		(T)	1.113	.574	.539	.000	80.02	4	(H2-1)	
534	T									NON-COM
		(T)	1.113	.574	.539	.000	.00	4	(H2-1)	
535	T									NON-COM
		(T)	1.032	.671	.360	.000	80.02	4	(H2-1)	
536	T									NON-COM
		(T)	1.032	.671	.360	.000	.00	4	(H2-1)	
537	T									NON-COM
		(T)	.884	.674	.210	.000	80.02	4	(H2-1)	
538	T									NON-COM
		(T)	.884	.674	.210	.000	.00	4	(H2-1)	
539	T									NON-COM
		(T)	1.016	.709	.307	.000	80.02	4	(H2-1)	
540	T									NON-COM
		(T)	1.017	.710	.307	.000	.00	4	(H2-1)	
541	T									NON-COM
		(C)	.524	.316	.209	.000	80.02	1	(H1-1)	
		(T)	1.124	.681	.443	.000	80.02	4	(H2-1)	
542	T									NON-COM
		(C)	.525	.316	.209	.000	.00	1	(H1-1)	
		(T)	1.124	.681	.443	.000	.00	4	(H2-1)	
543	T									NON-COM
		(T)	1.101	.591	.510	.000	80.02	4	(H2-1)	
544	T									NON-COM
		(T)	1.101	.591	.510	.000	.00	4	(H2-1)	
545	T									NON-COM
		(T)	1.024	.429	.595	.000	80.02	4	(H2-1)	
546	T									NON-COM
		(T)	1.025	.429	.595	.000	.00	4	(H2-1)	
547	T									NON-COM
		(T)	.785	.205	.580	.000	.00	4	(H2-1)	
548	T									NON-COM
		(T)	.587	.205	.382	.000	.00	4	(H2-1)	
553	G									NON-COM
		(C)	.683	.557	.125	.000	160.00	2	(H1-1)	

Truss T1 Hangars 44 and 45 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
554	G									NON-COM
		(C)	1.107	.821	.286	.000	160.00	4	(H1-1)	
555	T									NON-COM
		(C)	.982	.776	.206	.000	.00	4	(H1-1)	
556	T									NON-COM
		(C)	1.068	.817	.251	.000	160.00	4	(H1-1)	
557	T									NON-COM
		(C)	.771	.590	.181	.000	160.00	4	(H1-1)	
561	G									NON-COM
		(C)	.564	.473	.091	.000	160.00	1	(H1-1)	
		(T)	.935	.861	.074	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.816	.696	.120	.000	.00	1	(H1-1)	
		(T)	1.459	1.397	.063	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.827	.696	.130	.000	160.00	1	(H1-1)	
		(T)	1.459	1.397	.062	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.936	.862	.074	.000	160.00	4	(H2-1)	
568	T									NON-COM
		(C)	.760	.581	.178	.000	.00	4	(H1-1)	
569	T									NON-COM
		(C)	1.049	.805	.245	.000	.00	4	(H1-1)	
570	T									NON-COM
		(C)	.963	.762	.202	.000	160.00	4	(H1-1)	
571	G									NON-COM
		(C)	1.075	.799	.276	.000	.00	4	(H1-1)	
572	G									NON-COM
		(C)	.580	.438	.142	.000	160.00	4	(H1-1)	
577	G									NON-COM
		(C)	.867	.867	.000	.000	.00	5	(H1-1)	
		(T)	.747	.747	.000	.000	.00	4	(H2-1)	
				kl/r > 200						
578	G									NON-COM
		(C)	1.213	1.213	.000	.000	.00	5	(H1-1)	
		(T)	.561	.561	.000	.000	.00	4	(H2-1)	
				kl/r > 200						
579	G									NON-COM
		(C)	1.046	1.046	.000	.000	.00	5	(H1-1)	
				kl/r > 200						
580	G									NON-COM
		(C)	.619	.619	.000	.000	.00	5	(H1-1)	
581	G			kl/r > 200						NON-COM
582	G			kl/r > 200						NON-COM
583	G			kl/r > 200						NON-COM
		(C)	1.099	1.099	.000	.000	.00	5	(H1-1)	
				kl/r > 200						
584	G									NON-COM
		(C)	1.816	1.816	.000	.000	.00	5	(H1-1)	
		(T)	.573	.573	.000	.000	.00	4	(H2-1)	
				kl/r > 200						
585	G									NON-COM
		(C)	1.680	1.680	.000	.000	.00	5	(H1-1)	
		(T)	.722	.722	.000	.000	.00	4	(H2-1)	

Truss T1 Hangars 44 and 45 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
586	G		kl/r > 200							NON-COM
		(C)	1.558	1.558	.000	.000	.00	5	(H1-1)	
		(T)	.689	.689	.000	.000	.00	4	(H2-1)	
587	G		kl/r > 200							NON-COM
		(C)	1.553	1.553	.000	.000	.00	5	(H1-1)	
		(T)	.817	.817	.000	.000	.00	4	(H2-1)	
588	W14X61									COMPACT
		(T)	.705	.705	.000	.000	200.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.650	1.650	.000	.000	.00	1	(H1-1)	
		(T)	.815	.815	.000	.000	.00	4	(H2-1)	
590	G		kl/r > 200							NON-COM
		(C)	1.531	1.531	.000	.000	.00	1	(H1-1)	
		(T)	.686	.686	.000	.000	.00	4	(H2-1)	
591	G		kl/r > 200							NON-COM
		(C)	1.702	1.702	.000	.000	.00	1	(H1-1)	
		(T)	.719	.719	.000	.000	.00	4	(H2-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.590	1.590	.000	.000	.00	1	(H1-1)	
		(T)	.570	.570	.000	.000	.00	4	(H2-1)	
593	G		kl/r > 200							NON-COM
		(C)	.933	.933	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
		(C)	.843	.843	.000	.000	.00	1	(H1-1)	
597	G		kl/r > 200							NON-COM
		(C)	1.550	1.550	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.591	1.591	.000	.000	.00	1	(H1-1)	
		(T)	.564	.564	.000	.000	.00	4	(H2-1)	
599	G									NON-COM
		(C)	1.202	1.202	.000	.000	.00	1	(H1-1)	
		(T)	.750	.750	.000	.000	.00	4	(H2-1)	
701	T									NON-COM
		(C)	1.075	.970	.106	.000	113.14	4	(H1-1)	
702	T									NON-COM
		(C)	1.026	.925	.101	.000	.00	4	(H1-1)	
703	T									NON-COM
		(C)	1.807	1.620	.187	.000	114.32	4	(H1-1)	
704	T									NON-COM
		(C)	1.789	1.605	.184	.000	.00	4	(H1-1)	
705	T		fa > Fe							NON-COM
706	T		fa > Fe							NON-COM
707	T		fa > Fe							NON-COM
708	T		fa > Fe							NON-COM
709	2L3X2X5/16-3									NON-COM
		(C)	.747	.572	.175	.000	117.95	4	(H1-1)	
710	2L3X2X5/16-3									NON-COM
		(C)	.528	.396	.132	.000	.00	4	(H1-1)	

Truss T1 Hangars 44 and 45 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
713	T									NON-COM
		(C)	1.097	.797	.300	.000	.00	4	(H1-1)	
714	T									NON-COM
		(C)	1.228	.875	.353	.000	121.67	4	(H1-1)	
715	T			fa > Fe						NON-COM
716	T			fa > Fe						NON-COM
717	T			fa > Fe						NON-COM
718	T			fa > Fe						NON-COM
719	T			fa > Fe						NON-COM
720	T			fa > Fe						NON-COM
721	T			fa > Fe						NON-COM
722	T			fa > Fe						NON-COM
723	T			fa > Fe						NON-COM
724	T			fa > Fe						NON-COM
725	T			fa > Fe						NON-COM
726	T			fa > Fe						NON-COM
727	T			fa > Fe						NON-COM
728	T			fa > Fe						NON-COM
729	T			fa > Fe						NON-COM
730	T			fa > Fe						NON-COM
731	T			fa > Fe						NON-COM
732	T			fa > Fe						NON-COM
733	T			fa > Fe						NON-COM
734	T			fa > Fe						NON-COM
735	T									NON-COM
		(C)	1.210	.866	.344	.000	121.67	4	(H1-1)	
736	T									NON-COM
		(C)	1.080	.788	.293	.000	.00	4	(H1-1)	
739	2L3X2X5/16-3									NON-COM
		(C)	.552	.416	.136	.000	.00	4	(H1-1)	
740	2L3X2X5/16-3									NON-COM
		(C)	.773	.591	.182	.000	117.95	4	(H1-1)	
741	T			fa > Fe						NON-COM
742	T			fa > Fe						NON-COM
743	T			fa > Fe						NON-COM
744	T			fa > Fe						NON-COM
745	T									NON-COM
		(C)	1.799	1.613	.186	.000	.00	4	(H1-1)	
		(T)	.508	.491	.018	.000	57.16	1	(H2-1)	
746	T									NON-COM
		(C)	1.817	1.628	.189	.000	114.32	4	(H1-1)	
747	T									NON-COM
		(C)	.952	.859	.093	.000	.00	4	(H1-1)	
748	T									NON-COM
		(C)	1.001	.904	.097	.000	113.14	4	(H1-1)	
820	W18X76									COMPACT
		(C)	1.004	.083	.921	.000	289.00	5	(H1-3)	
		(T)	1.330	.174	1.156	.000	289.00	2	(H2-1)	

Truss T1 Hangars 44 and 45 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
823	W18X76									COMPACT
		(C)	.895	.021	.874	.000	.00	5	(H1-3)	
		(T)	1.200	.101	1.099	.000	.00	2	(H2-1)	
835	W18X46									COMPACT
		(C)	.529	.013	.516	.000	.00	2	(H1-3)	
838	W18X46									COMPACT
		(C)	.523	.013	.510	.000	78.00	2	(H1-3)	
859	W24X68									COMPACT
		(C)	1.381	.017	1.363	.000	.00	5	(H1-3)	
		(T)	1.288	.057	1.230	.000	.00	6	(H2-1)	
860	W24X68									COMPACT
		(C)	.746	.033	.713	.000	.00	1	(H1-3)	
		(T)	.571	.057	.514	.000	.00	6	(H2-1)	
861	W24X68									COMPACT
		(C)	.628	.017	.610	.000	78.00	5	(H1-3)	
		(T)	.532	.057	.475	.000	78.00	6	(H2-1)	
862	W24X68									COMPACT
		(C)	1.252	.033	1.219	.000	78.00	1	(H1-3)	
		(T)	1.054	.046	1.009	.000	78.00	2	(H2-1)	
867	W18X65									COMPACT
		(C)	1.560	.117	1.443	.000	180.50	1	(H1-3)	
		(T)	1.199	.015	1.184	.000	180.50	6	(H2-1)	
871	W18X76									COMPACT
		(C)	1.404	.142	1.263	.000	180.50	5	(H1-3)	
		(T)	1.077	.102	.976	.000	180.50	6	(H2-1)	
872	W18X76									COMPACT
		(C)	1.014	.120	.894	.000	108.50	1	(H1-3)	
		(T)	1.219	.181	1.038	.000	108.50	6	(H2-1)	
873	W18X76									COMPACT
		(T)	.568	.079	.489	.000	.00	6	(H2-1)	
874	W18X76									COMPACT
		(C)	.871	.021	.850	.000	.00	1	(H1-3)	
		(T)	1.062	.077	.985	.000	.00	6	(H2-1)	
998	G									NON-COM
		(C)	.707	.198	.508	.000	.00	5	(H1-1)	
		(T)	.762	.205	.557	.000	.00	2	(H2-1)	
999	G									NON-COM
		(C)	.838	.315	.523	.000	.00	1	(H1-1)	
		(T)	.800	.289	.511	.000	.00	6	(H2-1)	

Truss T1 Hangars 43 and 47 Knee Braces Average Wind

```
C
C SAP90 INPUT
C

system
L=10
C
C
C
joints
C     Truss Joints T1
501  x=0    z=0           y=240
549  x=3840 z=0           y=240 g=501,549,2
551  x=0    z=160         y=240
575  x=1920 z=200         y=240 g=551,575,1
599  x=3840 z=160         y=240 g=575,599,1
602  x=80   z=80
612  x=880  z=88.333            g=602,612,2
614  x=1040 z=91.6667     y=240
624  x=1840 z=100         y=240 g=614,624,2
626  x=2000 z=100         y=240
636  x=2800 z=91.6667     y=240 g=626,636,2
638  x=2960 z=88.3333     y=240
648  x=3760 z=80          y=240 g=638,648,2
C     Bracing Frame Joints T1
653  x=-312 z=-43    y=240
657  x=0    z=-43    y=240 g=653,657,1
659  x=-312 z=-203.5 y=240
663  x=0    z=-203.5 y=240 g=659,663,1
665  x=-312 z=-384   y=240
667  x=0    z=-384   y=240
674  x=3840 z=-43    y=240
678  x=4152 z=-43    y=240 g=674,678,1
679  x=3840 z=-203.5 y=240
683  x=4152 z=-203.5 y=240 g=679,683,1
685  x=3840 z=-384   y=240
686  x=4152 z=-384   y=240
998  x=0    z=-95    y=240
999  x=3840 z=-95    y=240

restraints
665  r=1,1,1,0,0,0
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
653 657 1 r=0,1,0,0,0,0
659 663 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
```

```
nm=57 nl=13 z=-1,0,0,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333   E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
13 sh=214x3x5/16-3        w=.0012
14 sh=216x4x3/8-3         w=.00205
15 sh=215x3x1/4-3         w=.0011
16 sh=215x3.5x5/16-3      w=.00145
17 sh=w18x65              w=.00541667
18 sh=w24x68              w=.005667
19 sh=w18x46              w=.0038333
20 sh=w18x65              w=.00541667
21 sh=216x6x5/8-3         w=.0040333
22 sh=213x2.5x1/4-3       w=.00075
23 sh=w8x18               w=.0015
24 sh=w12x22              w=.0018333
25 sh=w10x22              w=.0018333
26 sh=w14x30              w=.0025
27 sh=w8x31               w=.00258333
28 sh=w12x26              w=.0021667
29 sh=w10x12              w=.001
30 sh=w10x22              w=.0018333
31 sh=14x3x1/4            w=.00048333
32 sh=13.5x2.5x1/4        w=.000408333
33 sh=215x3.5x3/8-3       w=.0017333
34 sh=w14x90              w=.0075
35 sh=w14x145             w=.01208333
36 sh=w33x201             w=.01675
37 sh=217x4x1/2           w=.00298
38 sh=w14x74              w=.0061667
39 sh=w14x43              w=.00358333
40 sh=215x3x5/16          w=.0013667
41 sh=s12x50              w=.0041667
42 sh=w14x61              w=.00508333
43 sh=w6x16               w=.001333
44 sh=213x2.5x1/4-3       w=.00075
45 sh=mc12x31             w=.00258333
46 sh=mc12x31             w=.00258333
47 sh=mc12x31             w=.00258333
48 sh=216x3.5x3/8-3       w=.00195
49 sh=215x3x5/16-3        w=.0013667
50 sh=215x5x3/8           w=.00205
51 sh=13x2.5x1/4          w=.000375
52 sh=13x2x1/4            w=.000341667
53 sh=w14x30              w=.0025
54 sh=215x3.5x5/16-3      w=.00145
55 sh=w14x34              w=.0028333
56 sh=14x3x5/16           w=.0006
```

```
57 sh=218x8x1/2
C       Live Load on braced frames
1 wg=0,0,-.1667     :100 psf---T1
C       Slab load on braced frames
2 wg=0,0,-.08333    :150pcfx4 in. ---T1
C        Roof Dead Loads
3 wg=0,0,-.005
C        Roof Live Loads
4 wg=0,0,-.033333
C        Wind Span Loads
5 wg=.09667,0,0
6 wg=.101667,0,0
7 wg=.006667,0,0
8 wg=-.02333,0,0
9 wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
C          Truss Elements T1-b
588  525  575  m=42 lp=2,0
C               Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=-2,0  lr=1,0,0,0,0,0
552  503  505  m=3  lp=-2,0
553  505  507  m=3  lp=-2,0
554  507  509  m=3  lp=-2,0
555  509  511  m=11 lp=-2,0
556  511  513  m=11 lp=-2,0
557  513  515  m=11 lp=-2,0
558  515  517  m=11 lp=-2,0
559  517  519  m=3  lp=-2,0
560  519  521  m=3  lp=-2,0
561  521  523  m=3  lp=-2,0
562  523  525  m=3  lp=-2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=-2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=-2,0
565  529  531  m=3  lp=-2,0
566  531  533  m=3  lp=-2,0
567  533  535  m=11 lp=-2,0
568  535  537  m=11 lp=-2,0
569  537  539  m=11 lp=-2,0
570  539  541  m=11 lp=-2,0
571  541  543  m=3  lp=-2,0
572  543  545  m=3  lp=-2,0
573  545  547  m=3  lp=-2,0
574  547  549  m=3  lp=-2,0     lr=0,1,0,0,0,0
C              Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0      lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0      lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0      lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0      lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0      lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0      lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0     lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0     lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0     lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0     lr=0,1,0,0,0,0
```

```
721   622   521   m=15 lp=-2,0      lr=0,1,0,0,0,0
723   624   523   m=16 lp=-2,0      lr=0,1,0,0,0,0
726   626   527   m=16 lp=2,0       lr=0,1,0,0,0,0
728   628   529   m=15 lp=2,0       lr=0,1,0,0,0,0
730   630   531   m=13 lp=2,0       lr=0,1,0,0,0,0
732   632   533   m=8  lp=2,0       lr=0,1,0,0,0,0
734   634   535   m=10 lp=2,0       lr=0,1,0,0,0,0
736   636   537   m=13 lp=2,0       lr=0,1,0,0,0,0
737   638   537   m=13 lp=-2,0      lr=0,1,0,0,0,0
739   640   539   m=10 lp=-2,0      lr=0,1,0,0,0,0
741   642   541   m=9  lp=-2,0      lr=0,1,0,0,0,0
743   644   543   m=8  lp=-2,0      lr=0,1,0,0,0,0
745   646   545   m=7  lp=-2,0      lr=0,1,0,0,0,0
747   648   547   m=4  lp=-2,0      lr=0,1,0,0,0,0
C                Main Diagonal Top section
701   551   602   m=4  lp=2,0     lr=1,0,0,0,0,0
703   553   604   m=7  lp=2,0     lr=1,0,0,0,0,0
705   555   606   m=8  lp=2,0     lr=1,0,0,0,0,0
707   557   608   m=9  lp=2,0     lr=1,0,0,0,0,0
709   559   610   m=10 lp=2,0     lr=1,0,0,0,0,0
711   561   612   m=13 lp=2,0     lr=1,0,0,0,0,0
714   565   614   m=13 lp=-2,0    lr=1,0,0,0,0,0
716   567   616   m=10 lp=-2,0    lr=1,0,0,0,0,0
718   569   618   m=8  lp=-2,0    lr=1,0,0,0,0,0
720   571   620   m=13 lp=-2,0    lr=1,0,0,0,0,0
722   573   622   m=15 lp=-2,0    lr=1,0,0,0,0,0
724   575   624   m=16 lp=-2,0    lr=1,0,0,0,0,0
725   575   626   m=16 lp=2,0     lr=1,0,0,0,0,0
727   577   628   m=15 lp=2,0     lr=1,0,0,0,0,0
729   579   630   m=13 lp=2,0     lr=1,0,0,0,0,0
731   581   632   m=8  lp=2,0     lr=1,0,0,0,0,0
733   583   634   m=10 lp=2,0     lr=1,0,0,0,0,0
735   585   636   m=13 lp=2,0     lr=1,0,0,0,0,0
738   589   638   m=13 lp=-2,0    lr=1,0,0,0,0,0
740   591   640   m=10 lp=-2,0    lr=1,0,0,0,0,0
742   593   642   m=9  lp=-2,0    lr=1,0,0,0,0,0
744   595   644   m=8  lp=-2,0    lr=1,0,0,0,0,0
746   597   646   m=7  lp=-2,0    lr=1,0,0,0,0,0
748   599   648   m=4  lp=-2,0    lr=1,0,0,0,0,0
C               Diagonal Brace
626   553   602   m=5  lp=2,0       lr=1,1,0,0,0,0
627   555   604   m=5  lp=2,0       lr=1,1,0,0,0,0
628   557   606   m=5  lp=2,0       lr=1,1,0,0,0,0
629   559   608   m=5  lp=2,0       lr=1,1,0,0,0,0
630   561   610   m=5  lp=2,0       lr=1,1,0,0,0,0
631   563   612   m=5  lp=2,0       lr=1,1,0,0,0,0
632   563   614   m=5  lp=-2,0      lr=1,1,0,0,0,0
633   565   616   m=5  lp=-2,0      lr=1,1,0,0,0,0
634   567   618   m=5  lp=-2,0      lr=1,1,0,0,0,0
635   569   620   m=5  lp=-2,0      lr=1,1,0,0,0,0
636   571   622   m=5  lp=-2,0      lr=1,1,0,0,0,0
637   573   624   m=5  lp=-2,0      lr=1,1,0,0,0,0
638   577   626   m=5  lp=2,0       lr=1,1,0,0,0,0
639   579   628   m=5  lp=2,0       lr=1,1,0,0,0,0
640   581   630   m=5  lp=2,0       lr=1,1,0,0,0,0
641   583   632   m=5  lp=2,0       lr=1,1,0,0,0,0
642   585   634   m=5  lp=2,0       lr=1,1,0,0,0,0
```

```
643   587   636   m=5   lp=2,0        lr=1,1,0,0,0,0
644   587   638   m=5   lp=-2,0       lr=1,1,0,0,0,0
645   589   640   m=5   lp=-2,0       lr=1,1,0,0,0,0
646   591   642   m=5   lp=-2,0       lr=1,1,0,0,0,0
647   593   644   m=5   lp=-2,0       lr=1,1,0,0,0,0
648   595   646   m=5   lp=-2,0       lr=1,1,0,0,0,0
649   597   648   m=5   lp=-2,0       lr=1,1,0,0,0,0
C                    Vertical Brace
601   602   552   m=5   lp=2,0        lr=1,1,0,0,0,0
602   604   554   m=5   lp=2,0        lr=1,1,0,0,0,0
603   606   556   m=5   lp=2,0        lr=1,1,0,0,0,0
604   608   558   m=5   lp=2,0        lr=1,1,0,0,0,0
605   610   560   m=5   lp=2,0        lr=1,1,0,0,0,0
606   612   562   m=5   lp=2,0        lr=1,1,0,0,0,0
607   614   564   m=5   lp=2,0        lr=1,1,0,0,0,0
608   616   566   m=5   lp=2,0        lr=1,1,0,0,0,0
609   618   568   m=5   lp=2,0        lr=1,1,0,0,0,0
610   620   570   m=5   lp=2,0        lr=1,1,0,0,0,0
611   622   572   m=5   lp=2,0        lr=1,1,0,0,0,0
612   624   574   m=5   lp=2,0        lr=1,1,0,0,0,0
613   626   576   m=5   lp=-2,0       lr=1,1,0,0,0,0
614   628   578   m=5   lp=-2,0       lr=1,1,0,0,0,0
615   630   580   m=5   lp=-2,0       lr=1,1,0,0,0,0
616   632   582   m=5   lp=-2,0       lr=1,1,0,0,0,0
617   634   584   m=5   lp=-2,0       lr=1,1,0,0,0,0
618   636   586   m=5   lp=-2,0       lr=1,1,0,0,0,0
619   638   588   m=5   lp=-2,0       lr=1,1,0,0,0,0
620   640   590   m=5   lp=-2,0       lr=1,1,0,0,0,0
621   642   592   m=5   lp=-2,0       lr=1,1,0,0,0,0
622   644   594   m=5   lp=-2,0       lr=1,1,0,0,0,0
623   646   596   m=5   lp=-2,0       lr=1,1,0,0,0,0
624   648   598   m=5   lp=-2,0       lr=1,1,0,0,0,0
C                     Top Chord (3 axis ------)
501   551   552   m=2   lp=2,0        lr=1,0,0,0,0,0
502   552   553   m=2   lp=2,0
503   553   554   m=2   lp=2,0
504   554   555   m=2   lp=2,0
505   555   556   m=2   lp=2,0
506   556   557   m=2   lp=2,0
507   557   558   m=2   lp=2,0
508   558   559   m=2   lp=2,0
509   559   560   m=12  lp=2,0
510   560   561   m=12  lp=2,0
511   561   562   m=12  lp=2,0
512   562   563   m=12  lp=2,0
513   563   564   m=12  lp=2,0
514   564   565   m=12  lp=2,0
515   565   566   m=12  lp=2,0
516   566   567   m=12  lp=2,0
517   567   568   m=2   lp=2,0
518   568   569   m=2   lp=2,0
519   569   570   m=2   lp=2,0
520   570   571   m=2   lp=2,0
521   571   572   m=2   lp=2,0
522   572   573   m=2   lp=2,0
523   573   574   m=2   lp=2,0
524   574   575   m=2   lp=2,0      lr=0,1,0,0,0,0
```

```
525  575  576  m=2  lp=2,0    lr=1,0,0,0,0,0
526  576  577  m=2  lp=2,0
527  577  578  m=2  lp=2,0
528  578  579  m=2  lp=2,0
529  579  580  m=2  lp=2,0
530  580  581  m=2  lp=2,0
531  581  582  m=2  lp=2,0
532  582  583  m=2  lp=2,0
533  583  584  m=12 lp=2,0
534  584  585  m=12 lp=2,0
535  585  586  m=12 lp=2,0
536  586  587  m=12 lp=2,0
537  587  588  m=12 lp=2,0
538  588  589  m=12 lp=2,0
539  589  590  m=12 lp=2,0
540  590  591  m=12 lp=2,0
541  591  592  m=2  lp=2,0
542  592  593  m=2  lp=2,0
543  593  594  m=2  lp=2,0
544  594  595  m=2  lp=2,0
545  595  596  m=2  lp=2,0
546  596  597  m=2  lp=2,0
547  597  598  m=2  lp=2,0
548  598  599  m=2  lp=2,0    lr=0,1,0,0,0,0
C              South Vertical Member
576  501  551  m=1  lp=2,0   nsl=0,0,6,8,0,0,0,10,12,0 \
                               lr=1,1,0,0,0,0
577  503  553  m=6  lp=2,0     lr=1,1,0,0,0,0
578  505  555  m=6  lp=2,0     lr=1,1,0,0,0,0
579  507  557  m=6  lp=2,0     lr=1,1,0,0,0,0
580  509  559  m=6  lp=2,0     lr=1,1,0,0,0,0
581  511  561  m=6  lp=2,0     lr=1,1,0,0,0,0
582  513  563  m=6  lp=2,0     lr=1,1,0,0,0,0
583  515  565  m=6  lp=2,0     lr=1,1,0,0,0,0
584  517  567  m=6  lp=2,0     lr=1,1,0,0,0,0
585  519  569  m=6  lp=2,0     lr=1,1,0,0,0,0
586  521  571  m=14 lp=2,0     lr=1,1,0,0,0,0
587  523  573  m=14 lp=2,0     lr=1,1,0,0,0,0
589  527  577  m=14 lp=-2,0    lr=1,1,0,0,0,0
590  529  579  m=14 lp=-2,0    lr=1,1,0,0,0,0
591  531  581  m=6  lp=-2,0    lr=1,1,0,0,0,0
592  533  583  m=6  lp=-2,0    lr=1,1,0,0,0,0
593  535  585  m=6  lp=-2,0    lr=1,1,0,0,0,0
594  537  587  m=6  lp=-2,0    lr=1,1,0,0,0,0
595  539  589  m=6  lp=-2,0    lr=1,1,0,0,0,0
596  541  591  m=6  lp=-2,0    lr=1,1,0,0,0,0
597  543  593  m=6  lp=-2,0    lr=1,1,0,0,0,0
598  545  595  m=6  lp=-2,0    lr=1,1,0,0,0,0
599  547  597  m=6  lp=-2,0    lr=1,1,0,0,0,0
600  549  599  m=1  lp=2,0     nsl=0,0,7,9,0,0,0,11,13,0 \
                               lr=1,1,0,0,0,0
C      Bracing Frame Elements
805  653  654  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
806  654  655  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
807  655  656  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
808  656  657  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
809  659  660  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
```

```
810  660  661  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
811  661  662  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
812  662  663  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
817  665  659  m=20 lp=2,0     nsl=0,0,5,8,0,0,0,10,12,0
818  659  653  m=20 lp=2,0     nsl=0,0,5,8,0,0,0,10,12,0
820  667  663  m=1  lp=2,0
821  663  998  m=1  lp=2,0
823  998  657  m=1  lp=2,0
822  657  501  m=1  lp=2,0     nsl=0,0,5,8,0,0,0,10,12,0
835  674  675  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
836  675  676  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
837  676  677  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
838  677  678  m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
859  679  680  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
860  680  681  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
861  681  682  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
862  682  683  m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
867  686  683  m=20 lp=2,0     nsl=0,0,7,9,0,0,0,11,13,0
868  683  678  m=20 lp=2,0     nsl=0,0,7,9,0,0,0,11,13,0
871  685  679  m=1  lp=2,0
872  679  999  m=1  lp=2,0
874  999  674  m=1  lp=2,0
873  674  549  m=1  lp=2,0     nsl=0,0,7,9,0,0,0,11,13,0
C
C     Knee braces
998  998 503   m=57 lp=2,0
999  999 547   m=57 lp=2,0

loads
C Dead Loads
551 599 48 l=1 f=0,0,-.752
552 554  1 l=1 f=0,0,-1.474
555        l=1 f=0,0,-1.664
556 558 1  l=1 f=0,0,-1.474
559        l=1 f=0,0,-1.664
560 562 1  l=1 f=0,0,-1.474
563        l=1 f=0,0,-1.904
564 566 1  l=1 f=0,0,-1.474
567        l=1 f=0,0,-1.664
568 570 1  l=1 f=0,0,-1.474
571        l=1 f=0,0,-1.664
572 574 1  l=1 f=0,0,-1.474
575        l=1 f=0,0,-2.920
576 578 1  l=1 f=0,0,-1.474
579        l=1 f=0,0,-1.664
580 582 1  l=1 f=0,0,-1.474
583        l=1 f=0,0,-1.664
584 586 1  l=1 f=0,0,-1.474
587        l=1 f=0,0,-1.904
588 590 1  l=1 f=0,0,-1.474
591        l=1 f=0,0,-1.664
592 594 1  l=1 f=0,0,-1.474
595        l=1 f=0,0,-1.664
596 598 1  l=1 f=0,0,-1.474
551 599 48 l=1 f=0,0,-.347
555 559 4  l=1 f=0,0,-.557
563 587 24 l=1 f=0,0,-.322
```

```
567 571 4  l=1 f=0,0,-.557
575        l=1 f=0,0,-.163
579 583 4  l=1 f=0,0,-.557
591 595 4  l=1 f=0,0,-.557
509 517 8  l=1 f=0,0,-.355
533 541 8  l=1 f=0,0,-.355
C Live Loads
501 549 48   l=2 f=0,0,-1.066
503 523 2    l=2 f=0,0,-2.133
527 547 2    l=2 f=0,0,-2.133
C Wind I
551        l=3 f=4,0,0
551        l=3 f=0,0,1.73
552 557 1  l=3 f=0,0,3.47
558        l=3 f=0,0,1.67
559 564 1  l=3 f=0,0,1.06
565 598 1  l=3 f=0,0,-.4
599        l=3 f=0,0,-.2
C Wind II
551         l=4 f=-.9,0,0
551         l=4 f=0,0,6.27
552 557 1   l=4 f=0,0,12.53
558         l=4 f=0,0,10.73
559 564 1   l=4 f=0,0,10.13
565 598 1   l=4 f=0,0,8.67
599         l=4 f=0,0,4.33
C Point Loads
503 523 2    l=5 f=0,0,-.5
527 547 2    l=5 f=0,0,-.5
C Roof Live Loads
551 599 48  l=6 f=0,0,-1.333
552 598 1   l=6 f=0,0,-2.6667
C Crane Dead Loads for Down Force
527 547 20  l=7 f=0,0,-2.6
529 545 4   l=7 f=0,0,-2.6
527 547 20  l=7 f=0,0,-.773
529 545 16  l=7 f=0,0,-1.6
533 541 8   l=7 f=0,0,-2.134
505 523 18  l=7 f=0,0,-.552
511 517 6   l=7 f=0,0,-.960
C Wind III
551         l=8 f=0,0,1.93
552 557 1   l=8 f=0,0,3.87
558         l=8 f=0,0,3.87
559 564 1   l=8 f=0,0,3.87
565 598 1   l=8 f=0,0,3.87
599         l=8 f=0,0,1.93
C Wind IV
551         l=9 f=0,0,6.4
552 557 1   l=9 f=0,0,12.8
558         l=9 f=0,0,12.8
559 564 1   l=9 f=0,0,12.8
565 598 1   l=9 f=0,0,12.8
599         l=9 f=0,0,6.4
C Crane Dead Loads for Uplift
505 523 6   l=10 f=0,0,-.333
527 545 6   l=10 f=0,0,-.33
```

Truss T1 Hangars 43 and 47 Knee Braces Average Wind

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,1,0,0,0
2 c=1,0,0,1,1,0,1,0,0,0
3 c=1,0,0,0,1,0,1,1,0,0
4 c=1,0,0,0,1,0,1,0,1,0

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1           :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375           :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8          :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0              :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5          :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625      :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625      :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625      :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625      :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625      :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1           :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625    :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625      :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625      :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38              :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38                :2L8x8x1/2


frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
729 730 1 m=64
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735 738 1 m=64
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
805 812 1 l=1,.001
835 838 1 l=1,.001
859 862 1 l=1,.001
817 818 1 l=1,.001
820         l=1,.001
871         l=1,.001
867 868 1 l=1,.001
998 999 1 m=72
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Truss T1 Hangars 43 and 47 Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
502	T	(T)	.628	.142	.486	.000	80.02	2	(H2-1)	NON-COM
503	T	(T)	.826	.328	.499	.000	80.02	2	(H2-1)	NON-COM
504	T	(T)	.826	.327	.499	.000	.00	2	(H2-1)	NON-COM
505	T	(T)	.862	.454	.408	.000	80.02	2	(H2-1)	NON-COM
506	T	(T)	.862	.453	.408	.000	.00	2	(H2-1)	NON-COM
507	T	(T)	.834	.512	.322	.000	80.02	2	(H2-1)	NON-COM
508	T	(T)	.833	.511	.322	.000	.00	2	(H2-1)	NON-COM
509	T	(T)	.766	.524	.242	.000	80.02	4	(H2-1)	NON-COM
510	T	(T)	.766	.523	.242	.000	.00	4	(H2-1)	NON-COM
511	T	(T)	.679	.509	.170	.000	80.02	4	(H2-1)	NON-COM
512	T	(T)	.679	.509	.170	.000	.00	4	(H2-1)	NON-COM
513	T	(T)	.764	.492	.271	.000	80.02	2	(H2-1)	NON-COM
514	T	(T)	.763	.492	.271	.000	.00	2	(H2-1)	NON-COM
515	T	(T)	.822	.449	.373	.000	80.02	4	(H2-1)	NON-COM
516	T	(T)	.822	.449	.373	.000	.00	4	(H2-1)	NON-COM
517	T	(T)	.759	.354	.405	.000	80.02	4	(H2-1)	NON-COM
518	T	(T)	.758	.354	.405	.000	.00	4	(H2-1)	NON-COM
519	T	(T)	.636	.227	.409	.000	80.02	4	(H2-1)	NON-COM
520	T	(T)	.635	.226	.409	.000	.00	4	(H2-1)	NON-COM
521	T	(T)	.514	.063	.451	.000	80.02	4	(H2-1)	NON-COM
522	T	(T)	.522	.063	.459	.000	80.02	4	(H2-1)	NON-COM
523	T	(C)	.625	.189	.436	.000	.00	2	(H1-1)	NON-COM

526	T									NON-COM
		(C)	.605	.240	.364	.000	80.02	2	(H1-1)	
529	T									NON-COM
		(T)	.527	.154	.373	.000	80.02	4	(H2-1)	
530	T									NON-COM
		(T)	.527	.155	.373	.000	.00	4	(H2-1)	

Truss T1 Hangars 43 and 47 Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
531	T									NON-COM
		(T)	.632	.267	.366	.000	80.02	4	(H2-1)	
532	T									NON-COM
		(T)	.633	.267	.366	.000	.00	4	(H2-1)	
533	T									NON-COM
		(T)	.705	.358	.347	.000	80.02	4	(H2-1)	
534	T									NON-COM
		(T)	.705	.358	.347	.000	.00	4	(H2-1)	
535	T									NON-COM
		(T)	.640	.411	.229	.000	80.02	4	(H2-1)	
536	T									NON-COM
		(T)	.640	.411	.229	.000	.00	4	(H2-1)	
537	T									NON-COM
		(T)	.560	.413	.148	.000	80.02	4	(H2-1)	
538	T									NON-COM
		(T)	.560	.413	.148	.000	.00	4	(H2-1)	
539	T									NON-COM
		(T)	.654	.431	.223	.000	80.02	4	(H2-1)	
540	T									NON-COM
		(T)	.654	.431	.223	.000	.00	4	(H2-1)	
541	T									NON-COM
		(C)	.512	.322	.191	.000	80.02	1	(H1-1)	
		(T)	.697	.405	.292	.000	80.02	4	(H2-1)	
542	T									NON-COM
		(C)	.512	.322	.191	.000	.00	1	(H1-1)	
		(T)	.697	.405	.292	.000	.00	4	(H2-1)	
543	T									NON-COM
		(T)	.688	.351	.337	.000	80.02	4	(H2-1)	
544	T									NON-COM
		(T)	.688	.351	.337	.000	.00	4	(H2-1)	
545	T									NON-COM
		(T)	.628	.247	.381	.000	80.02	4	(H2-1)	
546	T									NON-COM
		(T)	.630	.247	.383	.000	80.02	4	(H2-1)	
553	G									NON-COM
		(C)	.554	.435	.120	.000	.00	2	(H1-1)	
554	G									NON-COM
		(C)	.914	.714	.200	.000	160.00	2	(H1-1)	
555	T									NON-COM
		(C)	.786	.645	.141	.000	.00	2	(H1-1)	
556	T									NON-COM
		(C)	.827	.666	.161	.000	160.00	2	(H1-1)	
557	T									NON-COM
		(C)	.618	.489	.129	.000	.00	2	(H1-1)	
561	G									NON-COM
		(C)	.545	.454	.091	.000	160.00	1	(H1-1)	
		(T)	.616	.553	.063	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.805	.685	.120	.000	.00	1	(H1-1)	
		(T)	.957	.906	.051	.000	80.00	4	(H2-1)	

Truss T1 Hangars 43 and 47 Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
563	G									NON-COM
		(C)	.816	.685	.131	.000	160.00	1	(H1-1)	
		(T)	.955	.906	.049	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.653	.604	.050	.000	160.00	4	(H2-1)	
577	G									NON-COM
		(T)	.647	.647	.000	.000	.00	2	(H2-1)	
578	G		kl/r > 200							NON-COM
		(C)	.617	.617	.000	.000	.00	3	(H1-1)	
579	G		kl/r > 200							NON-COM
580	G		kl/r > 200							NON-COM
581	G		kl/r > 200							NON-COM
582	G		kl/r > 200							NON-COM
583	G		kl/r > 200							NON-COM
		(C)	.901	.901	.000	.000	.00	3	(H1-1)	
584	G		kl/r > 200							NON-COM
		(C)	1.389	1.389	.000	.000	.00	3	(H1-1)	
585	G		kl/r > 200							NON-COM
		(C)	1.313	1.313	.000	.000	.00	1	(H1-1)	
586	G		kl/r > 200							NON-COM
		(C)	1.283	1.283	.000	.000	.00	1	(H1-1)	
587	G		kl/r > 200							NON-COM
		(C)	1.321	1.321	.000	.000	.00	1	(H1-1)	
		(T)	.542	.542	.000	.000	.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.697	1.697	.000	.000	.00	1	(H1-1)	
590	G		kl/r > 200							NON-COM
		(C)	1.588	1.588	.000	.000	.00	1	(H1-1)	
591	G		kl/r > 200							NON-COM
		(C)	1.781	1.781	.000	.000	.00	1	(H1-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.698	1.698	.000	.000	.00	1	(H1-1)	
593	G		kl/r > 200							NON-COM
		(C)	1.052	1.052	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
		(C)	.680	.680	.000	.000	.00	1	(H1-1)	
597	G		kl/r > 200							NON-COM
		(C)	1.379	1.379	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.453	1.453	.000	.000	.00	1	(H1-1)	
599	G									NON-COM
		(C)	1.127	1.127	.000	.000	.00	1	(H1-1)	
601	T		kl/r > 200							NON-COM
603	T		kl/r > 200							NON-COM
604	T		kl/r > 200							NON-COM
605	T		kl/r > 200							NON-COM
606	T		kl/r > 200							NON-COM
607	T		kl/r > 200							NON-COM

Truss T1 Hangars 43 and 47 Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
608	T		kl/r > 200							NON-COM
609	T		kl/r > 200							NON-COM
611	T		kl/r > 200							NON-COM
612	T		kl/r > 200							NON-COM
618	T		kl/r > 200							NON-COM
619	T		kl/r > 200							NON-COM
620	T		kl/r > 200							NON-COM
624	T		kl/r > 200							NON-COM
701	T									NON-COM
		(C)	.797	.724	.073	.000	113.14	2	(H1-1)	
702	T									NON-COM
		(C)	.742	.672	.070	.000	.00	2	(H1-1)	
703	T									NON-COM
		(C)	1.489	1.366	.123	.000	114.32	2	(H1-1)	
704	T									NON-COM
		(C)	1.455	1.335	.119	.000	.00	2	(H1-1)	
705	T		fa > Fe							NON-COM
706	T		fa > Fe							NON-COM
707	T									NON-COM
		(C)	9.270	.991	8.280	.000	116.73	4	(H1-1)	
708	T									NON-COM
		(C)	2.073	.929	1.144	.000	.00	4	(H1-1)	
709	2L3X2X5/16-3									NON-COM
		(C)	.677	.533	.144	.000	117.95	4	(H1-1)	
710	2L3X2X5/16-3									NON-COM
		(C)	.538	.418	.120	.000	.00	4	(H1-1)	
713	T									NON-COM
		(C)	.785	.608	.176	.000	.00	2	(H1-1)	
714	T									NON-COM
		(C)	.861	.668	.193	.000	121.67	2	(H1-1)	
715	T		fa > Fe							NON-COM
716	T		fa > Fe							NON-COM
717	T		fa > Fe							NON-COM
718	T		fa > Fe							NON-COM
719	T		fa > Fe							NON-COM
720	T		fa > Fe							NON-COM
721	T									NON-COM
		(C)	2.266	1.721	.545	.000	.00	4	(H1-1)	
722	T									NON-COM
		(C)	2.270	1.722	.547	.000	126.77	4	(H1-1)	
723	T									NON-COM
		(C)	2.824	1.546	1.278	.000	.00	4	(H1-1)	
724	T									NON-COM
		(C)	3.049	1.573	1.475	.000	128.06	4	(H1-1)	
725	T									NON-COM
		(C)	1.935	1.355	.579	.000	128.06	4	(H1-1)	
		(T)	.677	.619	.058	.000	96.05	1	(H2-1)	
726	T									NON-COM
		(C)	1.858	1.323	.535	.000	.00	4	(H1-1)	
		(T)	.677	.619	.058	.000	32.02	1	(H2-1)	

Truss T1 Hangars 43 and 47 Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
727	T									NON-COM
		(C)	1.846	1.505	.342	.000	126.77	4	(H1-1)	
		(T)	.583	.535	.049	.000	95.07	1	(H2-1)	
728	T									NON-COM
		(C)	1.831	1.494	.337	.000	.00	4	(H1-1)	
		(T)	.593	.545	.049	.000	31.69	1	(H2-1)	
729	T			fa > Fe						NON-COM
730	T			fa > Fe						NON-COM
731	T			fa > Fe						NON-COM
732	T			fa > Fe						NON-COM
733	T			fa > Fe						NON-COM
734	T			fa > Fe						NON-COM
735	T									NON-COM
		(C)	.618	.487	.130	.000	121.67	4	(H1-1)	
736	T									NON-COM
		(C)	.557	.445	.113	.000	.00	2	(H1-1)	
739	2L3X2X5/16-3									NON-COM
		(C)	.516	.405	.110	.000	.00	4	(H1-1)	
740	2L3X2X5/16-3									NON-COM
		(C)	.660	.526	.134	.000	117.95	4	(H1-1)	
741	T									NON-COM
		(C)	.975	.716	.259	.000	.00	4	(H1-1)	
742	T									NON-COM
		(C)	1.139	.790	.350	.000	116.73	4	(H1-1)	
743	T									NON-COM
		(C)	1.986	1.167	.819	.000	.00	4	(H1-1)	
744	T									NON-COM
		(C)	2.338	1.212	1.126	.000	115.52	4	(H1-1)	
745	T									NON-COM
		(C)	1.033	.961	.072	.000	.00	4	(H1-1)	
746	T									NON-COM
		(C)	1.051	.978	.073	.000	114.32	4	(H1-1)	
747	T									NON-COM
		(C)	.501	.455	.045	.000	.00	2	(H1-1)	
748	T									NON-COM
		(C)	.535	.489	.046	.000	113.14	2	(H1-1)	
809	W24X68									COMPACT
		(T)	.501	.052	.449	.000	.00	2	(H2-1)	
812	W24X68									COMPACT
		(C)	.821	.020	.801	.000	78.00	1	(H1-3)	
		(T)	.955	.052	.903	.000	78.00	2	(H2-1)	
817	W18X65									COMPACT
		(C)	.865	.008	.857	.000	180.50	2	(H1-3)	
		(T)	.601	.000	.601	.000	180.50	1	(H2-1)	
820	W18X76									COMPACT
		(C)	.884	.084	.800	.000	180.50	1	(H1-3)	
		(T)	.825	.119	.707	.000	180.50	2	(H2-1)	
821	W18X76									COMPACT
		(T)	1.068	.182	.886	.000	108.50	2	(H2-1)	

Truss T1 Hangars 43 and 47 Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
822	W18X76									COMPACT
		(T)	.563	.092	.471	.000	.00	2	(H2-1)	
823	W18X76									COMPACT
		(T)	.933	.093	.840	.000	.00	2	(H2-1)	
859	W24X68									COMPACT
		(C)	.642	.026	.616	.000	.00	1	(H1-3)	
860	W24X68									COMPACT
		(C)	.506	.026	.480	.000	.00	1	(H1-3)	
862	W24X68									COMPACT
		(C)	.839	.026	.814	.000	78.00	1	(H1-3)	
		(T)	.615	.049	.567	.000	78.00	2	(H2-1)	
867	W18X65									COMPACT
		(C)	1.079	.086	.993	.000	180.50	1	(H1-3)	
871	W18X76									COMPACT
		(C)	.723	.107	.615	.000	180.50	1	(H1-3)	
		(T)	.557	.084	.473	.000	180.50	2	(H2-1)	
872	W18X76									COMPACT
		(C)	.795	.119	.676	.000	108.50	1	(H1-3)	
		(T)	.659	.121	.538	.000	108.50	4	(H2-1)	
874	W18X76									COMPACT
		(C)	.685	.043	.642	.000	.00	1	(H1-3)	
		(T)	.567	.052	.514	.000	.00	4	(H2-1)	
998	G									NON-COM
		(T)	.693	.249	.444	.000	.00	2	(H2-1)	
999	G									NON-COM
		(C)	.619	.236	.383	.000	.00	1	(H1-1)	

Truss T1 Hangars 43 and 47   Knee Braces   Maximum Wind

c **SAP90 INPUT**

```
system
L=10
C
C
C
joints
C     Truss Joints T1
501  x=0    z=0          y=240
549  x=3840 z=0          y=240 g=501,549,2
551  x=0    z=160        y=240
575  x=1920 z=200        y=240 g=551,575,1
599  x=3840 z=160        y=240 g=575,599,1
602  x=80   z=80
612  x=880  z=88.333           g=602,612,2
614  x=1040 z=91.6667    y=240
624  x=1840 z=100        y=240 g=614,624,2
626  x=2000 z=100        y=240
636  x=2800 z=91.6667    y=240 g=626,636,2
638  x=2960 z=88.3333    y=240
648  x=3760 z=80         y=240 g=638,648,2
C     Bracing Frame Joints T1
653  x=-312 z=-43    y=240
657  x=0    z=-43    y=240 g=653,657,1
659  x=-312 z=-203.5 y=240
663  x=0    z=-203.5 y=240 g=659,663,1
665  x=-312 z=-384   y=240
667  x=0    z=-384   y=240
674  x=3840 z=-43    y=240
678  x=4152 z=-43    y=240 g=674,678,1
679  x=3840 z=-203.5 y=240
683  x=4152 z=-203.5 y=240 g=679,683,1
685  x=3840 z=-384   y=240
686  x=4152 z=-384   y=240
998  x=0    z=-95    y=240
999  x=3840 z=-95    y=240

restraints
665  r=1,1,1,0,0,0
667  r=1,1,1,0,0,0
685  r=1,1,1,0,0,0
686  r=1,1,1,0,0,0
525  r=0,1,1,0,0,0
501 523 2 r=0,1,0,0,0,0
527 549 2 r=0,1,0,0,0,0
551 599 1 r=0,1,0,0,0,0
653 657 1 r=0,1,0,0,0,0
659 663 1 r=0,1,0,0,0,0
674 678 1 r=0,1,0,0,0,0
679 683 1 r=0,1,0,0,0,0

frame
nm=57 nl=13 z=-1,0,0,0,0,0,0,0,0,0
```

1	sh=w18x76	w=.006333	E=29000
2	sh=218x6x1/2-3	w=.0038333	
3	sh=216x6x3/8-3	w=.00248333	
4	sh=213x3.5x5/16-3	w=.0011	
5	sh=213x3x1/4-3	w=.00081667	
6	sh=216x3.5x5/16-3	w=.0016333	
7	sh=213x3x5/16-3	w=.00101667	
8	sh=2L3.5X2.5X5/16-3	w=.001008333	
9	sh=213x2.5x1/4-3	w=.00075	
10	sh=213x2x5/16-3	w=.0008333	
11	sh=216x6x1/2-3	w=.0030667	
12	sh=218x6x1/2-3	w=.0038333	
13	sh=214x3x5/16-3	w=.0012	
14	sh=216x4x3/8-3	w=.00205	
15	sh=215x3x1/4-3	w=.0011	
16	sh=215x3.5x5/16-3	w=.00145	
17	sh=w18x65	w=.00541667	
18	sh=w24x68	w=.005667	
19	sh=w18x46	w=.0038333	
20	sh=w18x65	w=.00541667	
21	sh=216x6x5/8-3	w=.0040333	
22	sh=213x2.5x1/4-3	w=.00075	
23	sh=w8x18	w=.0015	
24	sh=w12x22	w=.0018333	
25	sh=w10x22	w=.0018333	
26	sh=w14x30	w=.0025	
27	sh=w8x31	w=.00258333	
28	sh=w12x26	w=.0021667	
29	sh=w10x12	w=.001	
30	sh=w10x22	w=.0018333	
31	sh=14x3x1/4	w=.00048333	
32	sh=13.5x2.5x1/4	w=.000408333	
33	sh=215x3.5x3/8-3	w=.0017333	
34	sh=w14x90	w=.0075	
35	sh=w14x145	w=.01208333	
36	sh=w33x201	w=.01675	
37	sh=217x4x1/2	w=.00298	
38	sh=w14x74	w=.0061667	
39	sh=w14x43	w=.00358333	
40	sh=215x3x5/16	w=.0013667	
41	sh=s12x50	w=.0041667	
42	sh=w14x61	w=.00508333	
43	sh=w6x16	w=.001333	
44	sh=213x2.5x1/4-3	w=.00075	
45	sh=mc12x31	w=.00258333	
46	sh=mc12x31	w=.00258333	
47	sh=mc12x31	w=.00258333	
48	sh=216x3.5x3/8-3	w=.00195	
49	sh=215x3x5/16-3	w=.0013667	
50	sh=215x5x3/8	w=.00205	
51	sh=13x2.5x1/4	w=.000375	
52	sh=13x2x1/4	w=.000341667	
53	sh=w14x30	w=.0025	
54	sh=215x3.5x5/16-3	w=.00145	
55	sh=w14x34	w=.0028333	
56	sh=14x3x5/16	w=.0006	
57	sh=218x8x1/2		

```
C      Live Load on braced frames
1 wg=0,0,-.1667     :100 psf---T1
C      Slab load on braced frames
2 wg=0,0,-.08333    :150pcfx4 in. ---T1
C       Roof Dead Loads
3 wg=0,0,-.005
C       Roof Live Loads
4 wg=0,0,-.033333
C       Wind Span Loads
5 wg=.09667,0,0
6 wg=.101667,0,0
7 wg=.006667,0,0
8 wg=-.02333,0,0
9 wg=.12,0,0
10 wg=-.03,0,0
11 wg=.03,0,0
12 wg=-.14333,0,0
13 wg=.14333,0,0
C         Truss Elements T1-b
588  525  575  m=42 lp=2,0
C              Bottom Chord (3 axis --- +Y)
551  501  503  m=3  lp=-2,0  lr=1,0,0,0,0,0
552  503  505  m=3  lp=-2,0
553  505  507  m=3  lp=-2,0
554  507  509  m=3  lp=-2,0
555  509  511  m=11 lp=-2,0
556  511  513  m=11 lp=-2,0
557  513  515  m=11 lp=-2,0
558  515  517  m=11 lp=-2,0
559  517  519  m=3  lp=-2,0
560  519  521  m=3  lp=-2,0
561  521  523  m=3  lp=-2,0
562  523  525  m=3  lp=-2,0  lr=0,1,0,0,0,0
563  525  527  m=3  lp=-2,0  lr=1,0,0,0,0,0
564  527  529  m=3  lp=-2,0
565  529  531  m=3  lp=-2,0
566  531  533  m=3  lp=-2,0
567  533  535  m=11 lp=-2,0
568  535  537  m=11 lp=-2,0
569  537  539  m=11 lp=-2,0
570  539  541  m=11 lp=-2,0
571  541  543  m=3  lp=-2,0
572  543  545  m=3  lp=-2,0
573  545  547  m=3  lp=-2,0
574  547  549  m=3  lp=-2,0     lr=0,1,0,0,0,0
C             Main Diagonal Bottom Section
702  602  503  m=4  lp=2,0      lr=0,1,0,0,0,0
704  604  505  m=7  lp=2,0      lr=0,1,0,0,0,0
706  606  507  m=8  lp=2,0      lr=0,1,0,0,0,0
708  608  509  m=9  lp=2,0      lr=0,1,0,0,0,0
710  610  511  m=10 lp=2,0      lr=0,1,0,0,0,0
712  612  513  m=13 lp=2,0      lr=0,1,0,0,0,0
713  614  513  m=13 lp=-2,0     lr=0,1,0,0,0,0
715  616  515  m=10 lp=-2,0     lr=0,1,0,0,0,0
717  618  517  m=8  lp=-2,0     lr=0,1,0,0,0,0
719  620  519  m=13 lp=-2,0     lr=0,1,0,0,0,0
721  622  521  m=15 lp=-2,0     lr=0,1,0,0,0,0
```

```
723  624  523  m=16 lp=-2,0      lr=0,1,0,0,0,0
726  626  527  m=16 lp=2,0       lr=0,1,0,0,0,0
728  628  529  m=15 lp=2,0       lr=0,1,0,0,0,0
730  630  531  m=13 lp=2,0       lr=0,1,0,0,0,0
732  632  533  m=8  lp=2,0       lr=0,1,0,0,0,0
734  634  535  m=10 lp=2,0       lr=0,1,0,0,0,0
736  636  537  m=13 lp=2,0       lr=0,1,0,0,0,0
737  638  537  m=13 lp=-2,0      lr=0,1,0,0,0,0
739  640  539  m=10 lp=-2,0      lr=0,1,0,0,0,0
741  642  541  m=9  lp=-2,0      lr=0,1,0,0,0,0
743  644  543  m=8  lp=-2,0      lr=0,1,0,0,0,0
745  646  545  m=7  lp=-2,0      lr=0,1,0,0,0,0
747  648  547  m=4  lp=-2,0      lr=0,1,0,0,0,0
C              Main Diagonal Top section
701  551  602  m=4  lp=2,0      lr=1,0,0,0,0,0
703  553  604  m=7  lp=2,0      lr=1,0,0,0,0,0
705  555  606  m=8  lp=2,0      lr=1,0,0,0,0,0
707  557  608  m=9  lp=2,0      lr=1,0,0,0,0,0
709  559  610  m=10 lp=2,0      lr=1,0,0,0,0,0
711  561  612  m=13 lp=2,0      lr=1,0,0,0,0,0
714  565  614  m=13 lp=-2,0     lr=1,0,0,0,0,0
716  567  616  m=10 lp=-2,0     lr=1,0,0,0,0,0
718  569  618  m=8  lp=-2,0     lr=1,0,0,0,0,0
720  571  620  m=13 lp=-2,0     lr=1,0,0,0,0,0
722  573  622  m=15 lp=-2,0     lr=1,0,0,0,0,0
724  575  624  m=16 lp=-2,0     lr=1,0,0,0,0,0
725  575  626  m=16 lp=2,0      lr=1,0,0,0,0,0
727  577  628  m=15 lp=2,0      lr=1,0,0,0,0,0
729  579  630  m=13 lp=2,0      lr=1,0,0,0,0,0
731  581  632  m=8  lp=2,0      lr=1,0,0,0,0,0
733  583  634  m=10 lp=2,0      lr=1,0,0,0,0,0
735  585  636  m=13 lp=2,0      lr=1,0,0,0,0,0
738  589  638  m=13 lp=-2,0     lr=1,0,0,0,0,0
740  591  640  m=10 lp=-2,0     lr=1,0,0,0,0,0
742  593  642  m=9  lp=-2,0     lr=1,0,0,0,0,0
744  595  644  m=8  lp=-2,0     lr=1,0,0,0,0,0
746  597  646  m=7  lp=-2,0     lr=1,0,0,0,0,0
748  599  648  m=4  lp=-2,0     lr=1,0,0,0,0,0
C              Diagonal Brace
626  553  602  m=5  lp=2,0       lr=1,1,0,0,0,0
627  555  604  m=5  lp=2,0       lr=1,1,0,0,0,0
628  557  606  m=5  lp=2,0       lr=1,1,0,0,0,0
629  559  608  m=5  lp=2,0       lr=1,1,0,0,0,0
630  561  610  m=5  lp=2,0       lr=1,1,0,0,0,0
631  563  612  m=5  lp=2,0       lr=1,1,0,0,0,0
632  563  614  m=5  lp=-2,0      lr=1,1,0,0,0,0
633  565  616  m=5  lp=-2,0      lr=1,1,0,0,0,0
634  567  618  m=5  lp=-2,0      lr=1,1,0,0,0,0
635  569  620  m=5  lp=-2,0      lr=1,1,0,0,0,0
636  571  622  m=5  lp=-2,0      lr=1,1,0,0,0,0
637  573  624  m=5  lp=-2,0      lr=1,1,0,0,0,0
638  577  626  m=5  lp=2,0       lr=1,1,0,0,0,0
639  579  628  m=5  lp=2,0       lr=1,1,0,0,0,0
640  581  630  m=5  lp=2,0       lr=1,1,0,0,0,0
641  583  632  m=5  lp=2,0       lr=1,1,0,0,0,0
642  585  634  m=5  lp=2,0       lr=1,1,0,0,0,0
643  587  636  m=5  lp=2,0       lr=1,1,0,0,0,0
```

```
644  587  638  m=5  lp=-2,0     lr=1,1,0,0,0,0
645  589  640  m=5  lp=-2,0     lr=1,1,0,0,0,0
646  591  642  m=5  lp=-2,0     lr=1,1,0,0,0,0
647  593  644  m=5  lp=-2,0     lr=1,1,0,0,0,0
648  595  646  m=5  lp=-2,0     lr=1,1,0,0,0,0
649  597  648  m=5  lp=-2,0     lr=1,1,0,0,0,0
C              Vertical Brace
601  602  552  m=5  lp=2,0      lr=1,1,0,0,0,0
602  604  554  m=5  lp=2,0      lr=1,1,0,0,0,0
603  606  556  m=5  lp=2,0      lr=1,1,0,0,0,0
604  608  558  m=5  lp=2,0      lr=1,1,0,0,0,0
605  610  560  m=5  lp=2,0      lr=1,1,0,0,0,0
606  612  562  m=5  lp=2,0      lr=1,1,0,0,0,0
607  614  564  m=5  lp=2,0      lr=1,1,0,0,0,0
608  616  566  m=5  lp=2,0      lr=1,1,0,0,0,0
609  618  568  m=5  lp=2,0      lr=1,1,0,0,0,0
610  620  570  m=5  lp=2,0      lr=1,1,0,0,0,0
611  622  572  m=5  lp=2,0      lr=1,1,0,0,0,0
612  624  574  m=5  lp=2,0      lr=1,1,0,0,0,0
613  626  576  m=5  lp=-2,0     lr=1,1,0,0,0,0
614  628  578  m=5  lp=-2,0     lr=1,1,0,0,0,0
615  630  580  m=5  lp=-2,0     lr=1,1,0,0,0,0
616  632  582  m=5  lp=-2,0     lr=1,1,0,0,0,0
617  634  584  m=5  lp=-2,0     lr=1,1,0,0,0,0
618  636  586  m=5  lp=-2,0     lr=1,1,0,0,0,0
619  638  588  m=5  lp=-2,0     lr=1,1,0,0,0,0
620  640  590  m=5  lp=-2,0     lr=1,1,0,0,0,0
621  642  592  m=5  lp=-2,0     lr=1,1,0,0,0,0
622  644  594  m=5  lp=-2,0     lr=1,1,0,0,0,0
623  646  596  m=5  lp=-2,0     lr=1,1,0,0,0,0
624  648  598  m=5  lp=-2,0     lr=1,1,0,0,0,0
C               Top Chord (3 axis ------)
501  551  552  m=2  lp=2,0      lr=1,0,0,0,0,0
502  552  553  m=2  lp=2,0
503  553  554  m=2  lp=2,0
504  554  555  m=2  lp=2,0
505  555  556  m=2  lp=2,0
506  556  557  m=2  lp=2,0
507  557  558  m=2  lp=2,0
508  558  559  m=2  lp=2,0
509  559  560  m=12 lp=2,0
510  560  561  m=12 lp=2,0
511  561  562  m=12 lp=2,0
512  562  563  m=12 lp=2,0
513  563  564  m=12 lp=2,0
514  564  565  m=12 lp=2,0
515  565  566  m=12 lp=2,0
516  566  567  m=12 lp=2,0
517  567  568  m=2  lp=2,0
518  568  569  m=2  lp=2,0
519  569  570  m=2  lp=2,0
520  570  571  m=2  lp=2,0
521  571  572  m=2  lp=2,0
522  572  573  m=2  lp=2,0
523  573  574  m=2  lp=2,0
524  574  575  m=2  lp=2,0    lr=0,1,0,0,0,0
525  575  576  m=2  lp=2,0    lr=1,0,0,0,0,0
```

```
526   576   577   m=2   lp=2,0
527   577   578   m=2   lp=2,0
528   578   579   m=2   lp=2,0
529   579   580   m=2   lp=2,0
530   580   581   m=2   lp=2,0
531   581   582   m=2   lp=2,0
532   582   583   m=2   lp=2,0
533   583   584   m=12  lp=2,0
534   584   585   m=12  lp=2,0
535   585   586   m=12  lp=2,0
536   586   587   m=12  lp=2,0
537   587   588   m=12  lp=2,0
538   588   589   m=12  lp=2,0
539   589   590   m=12  lp=2,0
540   590   591   m=12  lp=2,0
541   591   592   m=2   lp=2,0
542   592   593   m=2   lp=2,0
543   593   594   m=2   lp=2,0
544   594   595   m=2   lp=2,0
545   595   596   m=2   lp=2,0
546   596   597   m=2   lp=2,0
547   597   598   m=2   lp=2,0
548   598   599   m=2   lp=2,0    lr=0,1,0,0,0,0
C                South Vertical Member
576   501   551   m=1   lp=2,0   nsl=0,0,6,8,0,0,0,10,12,0 \
                                     lr=1,1,0,0,0,0
577   503   553   m=6   lp=2,0     lr=1,1,0,0,0,0
578   505   555   m=6   lp=2,0     lr=1,1,0,0,0,0
579   507   557   m=6   lp=2,0     lr=1,1,0,0,0,0
580   509   559   m=6   lp=2,0     lr=1,1,0,0,0,0
581   511   561   m=6   lp=2,0     lr=1,1,0,0,0,0
582   513   563   m=6   lp=2,0     lr=1,1,0,0,0,0
583   515   565   m=6   lp=2,0     lr=1,1,0,0,0,0
584   517   567   m=6   lp=2,0     lr=1,1,0,0,0,0
585   519   569   m=6   lp=2,0     lr=1,1,0,0,0,0
586   521   571   m=14  lp=2,0     lr=1,1,0,0,0,0
587   523   573   m=14  lp=2,0     lr=1,1,0,0,0,0
589   527   577   m=14  lp=-2,0    lr=1,1,0,0,0,0
590   529   579   m=14  lp=-2,0    lr=1,1,0,0,0,0
591   531   581   m=6   lp=-2,0    lr=1,1,0,0,0,0
592   533   583   m=6   lp=-2,0    lr=1,1,0,0,0,0
593   535   585   m=6   lp=-2,0    lr=1,1,0,0,0,0
594   537   587   m=6   lp=-2,0    lr=1,1,0,0,0,0
595   539   589   m=6   lp=-2,0    lr=1,1,0,0,0,0
596   541   591   m=6   lp=-2,0    lr=1,1,0,0,0,0
597   543   593   m=6   lp=-2,0    lr=1,1,0,0,0,0
598   545   595   m=6   lp=-2,0    lr=1,1,0,0,0,0
599   547   597   m=6   lp=-2,0    lr=1,1,0,0,0,0
600   549   599   m=1   lp=2,0     nsl=0,0,7,9,0,0,0,11,13,0 \
                                     lr=1,1,0,0,0,0
C      Bracing Frame Elements
805   653   654   m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
806   654   655   m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
807   655   656   m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
808   656   657   m=19 lp=2,0       nsl=3,0,0,0,0,4,0,0,0,0
809   659   660   m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
810   660   661   m=18 lp=2,0       nsl=2,1,0,0,0,0,0,0,0,0
```

```
811   661   662   m=18 lp=2,0         nsl=2,1,0,0,0,0,0,0,0,0
812   662   663   m=18 lp=2,0         nsl=2,1,0,0,0,0,0,0,0,0
817   665   659   m=20 lp=2,0       nsl=0,0,5,8,0,0,0,10,12,0
818   659   653   m=20 lp=2,0       nsl=0,0,5,8,0,0,0,10,12,0
820   667   663   m=1  lp=2,0
821   663   998   m=1  lp=2,0
823   998   657   m=1  lp=2,0
822   657   501   m=1  lp=2,0       nsl=0,0,5,8,0,0,0,10,12,0
835   674   675   m=19 lp=2,0         nsl=3,0,0,0,0,4,0,0,0,0
836   675   676   m=19 lp=2,0         nsl=3,0,0,0,0,4,0,0,0,0
837   676   677   m=19 lp=2,0         nsl=3,0,0,0,0,4,0,0,0,0
838   677   678   m=19 lp=2,0         nsl=3,0,0,0,0,4,0,0,0,0
859   679   680   m=18 lp=2,0         nsl=2,1,0,0,0,0,0,0,0,0
860   680   681   m=18 lp=2,0         nsl=2,1,0,0,0,0,0,0,0,0
861   681   682   m=18 lp=2,0         nsl=2,1,0,0,0,0,0,0,0,0
862   682   683   m=18 lp=2,0         nsl=2,1,0,0,0,0,0,0,0,0
867   686   683   m=20 lp=2,0       nsl=0,0,7,9,0,0,0,11,13,0
868   683   678   m=20 lp=2,0       nsl=0,0,7,9,0,0,0,11,13,0
871   685   679   m=1  lp=2,0
872   679   999   m=1  lp=2,0
874   999   674   m=1  lp=2,0
873   674   549   m=1  lp=2,0       nsl=0,0,7,9,0,0,0,11,13,0
C
C      Knee braces
998   998 503    m=57 lp=2,0
999   999 547    m=57 lp=2,0

loads
C Dead Loads
551 599 48 l=1 f=0,0,-.752
552 554  1 l=1 f=0,0,-1.474
555        l=1 f=0,0,-1.664
556 558 1  l=1 f=0,0,-1.474
559        l=1 f=0,0,-1.664
560 562 1  l=1 f=0,0,-1.474
563        l=1 f=0,0,-1.904
564 566 1  l=1 f=0,0,-1.474
567        l=1 f=0,0,-1.664
568 570 1  l=1 f=0,0,-1.474
571        l=1 f=0,0,-1.664
572 574 1  l=1 f=0,0,-1.474
575        l=1 f=0,0,-2.920
576 578 1  l=1 f=0,0,-1.474
579        l=1 f=0,0,-1.664
580 582 1  l=1 f=0,0,-1.474
583        l=1 f=0,0,-1.664
584 586 1  l=1 f=0,0,-1.474
587        l=1 f=0,0,-1.904
588 590 1  l=1 f=0,0,-1.474
591        l=1 f=0,0,-1.664
592 594 1  l=1 f=0,0,-1.474
595        l=1 f=0,0,-1.664
596 598 1  l=1 f=0,0,-1.474
551 599 48 l=1 f=0,0,-.347
555 559 4  l=1 f=0,0,-.557
563 587 24 l=1 f=0,0,-.322
567 571 4  l=1 f=0,0,-.557
```

```
575         l=1 f=0,0,-.163
579 583 4   l=1 f=0,0,-.557
591 595 4   l=1 f=0,0,-.557
509 517 8   l=1 f=0,0,-.355
533 541 8   l=1 f=0,0,-.355
C Live Loads
501 549 48    l=2 f=0,0,-1.066
503 523 2     l=2 f=0,0,-2.133
527 547 2     l=2 f=0,0,-2.133
C Wind I
551         l=3 f=4,0,0
551         l=3 f=0,0,1.73
552 557 1   l=3 f=0,0,3.47
558         l=3 f=0,0,1.67
559 564 1   l=3 f=0,0,1.06
565 598 1   l=3 f=0,0,-.4
599         l=3 f=0,0,-.2
C Wind II
551          l=4 f=-.9,0,0
551          l=4 f=0,0,6.27
552 557 1    l=4 f=0,0,12.53
558          l=4 f=0,0,10.73
559 564 1    l=4 f=0,0,10.13
565 598 1    l=4 f=0,0,8.67
599          l=4 f=0,0,4.33
C Point Loads
503 523 2     l=5 f=0,0,-.5
527 547 2     l=5 f=0,0,-.5
C Roof Live Loads
551 599 48   l=6 f=0,0,-1.333
552 598 1    l=6 f=0,0,-2.6667
C Crane Dead Loads for Down Force
527 547 20   l=7 f=0,0,-2.6
529 545 4    l=7 f=0,0,-2.6
527 547 20   l=7 f=0,0,-.773
529 545 16   l=7 f=0,0,-1.6
533 541 8    l=7 f=0,0,-2.134
505 523 18   l=7 f=0,0,-.552
511 517 6    l=7 f=0,0,-.960
C Wind III
551          l=8 f=0,0,1.93
552 557 1    l=8 f=0,0,3.87
558          l=8 f=0,0,3.87
559 564 1    l=8 f=0,0,3.87
565 598 1    l=8 f=0,0,3.87
599          l=8 f=0,0,1.93
C Wind IV
551          l=9 f=0,0,6.4
552 557 1    l=9 f=0,0,12.8
558          l=9 f=0,0,12.8
559 564 1    l=9 f=0,0,12.8
565 598 1    l=9 f=0,0,12.8
599          l=9 f=0,0,6.4
C Crane Dead Loads for Uplift
505 523 6    l=10 f=0,0,-.333
527 545 6    l=10 f=0,0,-.33
```

Truss T1 Hangars 43 and 47 Knee Braces **Maximum Wind**

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1,5,7,10 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,1,0,0,0
2 c=1,0,0,1,1,0,0,0,0,1
3 c=1,0,0,0,1,0,0,1,0,1
4 c=1,0,0,0,1,0,0,0,1,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1              :2L8x6x1/2
C
58 mn=s sh=G e=29000 fy=36 a=8.72 i=30.8,59.9 \
 as=4.5,4.5 z=12.7,15.9 t=8.725,12.375              :2L6x6x3/8
59 mn=s sh=g e=29000 fy=36 a=5.74 i=28.0,16.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8             :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.8 \
 as=3.0,3.0 z=11.9,15.4 t=9.13,11.0                 :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5             :2L3x2x1/4
62 mn=s sh=t e=29000 fy=36 t=3,7,.3125,.625         :2L3x3.5x5/16
63 mn=s sh=t e=29000 fy=36 t=3,6,.3125,.625         :2L3x3x5/16
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625         :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.3125,.625         :2L5x3x5/16
66 mn=s sh=t e=29000 fy=36 t=5,7,.3125,.625         :2L5x3.5x5/16
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1              :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.3125,.625         :2L3x2.5x5/16
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625         :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.9 \
 as=3.75,2.2 z=9.7,5.46 t=7.98,7.38                 :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,185 \
 as=8,8 z=30.1,36.9 t=11.65,16.38                   :2L8x8x1/2


frame
501 548 1 m=57
551 554 1 m=58
559 566 1 m=58
571 574 1 m=58
577 579 1 m=71
580 585 1 m=59
586 587 1 m=60
588       k=1,1
589 590 1 m=60
591 596 1 m=59
597 599 1 m=71
601 649 1 m=61
711 714 1 m=64
719 720 1 m=64
721 722 1 m=65
723 726 1 m=66
727 728 1 m=65
729 730 1 m=64
```

```
735 738 1 m=64
555 558 1 m=67
567 570 1 m=67
701 702 1 m=66
703 704 1 m=65
705 706 1 m=68
707 708 1 m=69
715 716 1 m=70
717 718 1 m=68
731 732 1 m=68
733 734 1 m=70
741 742 1 m=69
743 744 1 m=68
745 746 1 m=65
747 748 1 m=66
805 812 1 l=1,.001
835 838 1 l=1,.001
859 862 1 l=1,.001
817 818 1 l=1,.001
820        l=1,.001
871        l=1,.001
867 868 1 l=1,.001
998 999 1 m=72
```

Truss T1 Hangars 43 and 47 Retrofit: Knee Braces
Maximum Wind

SAP90_FILE:t1-47k/SAPSTL_FILE:asd.STL
Truss T1 Hangars 43 and 47 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
501	T									NON-COM
		(T)	.575	.199	.376	.000	80.02	4	(H2-1)	
502	T									NON-COM
		(T)	.787	.198	.589	.000	80.02	4	(H2-1)	
503	T									NON-COM
		(T)	1.025	.425	.600	.000	80.02	4	(H2-1)	
504	T									NON-COM
		(T)	1.024	.424	.600	.000	.00	4	(H2-1)	
505	T									NON-COM
		(T)	1.104	.589	.515	.000	80.02	4	(H2-1)	
506	T									NON-COM
		(T)	1.103	.589	.515	.000	.00	4	(H2-1)	
507	T									NON-COM
		(T)	1.130	.681	.448	.000	80.02	4	(H2-1)	
508	T									NON-COM
		(T)	1.129	.681	.448	.000	.00	4	(H2-1)	
509	T									NON-COM
		(T)	1.024	.712	.312	.000	80.02	4	(H2-1)	
510	T									NON-COM
		(T)	1.023	.711	.312	.000	.00	4	(H2-1)	
511	T									NON-COM
		(T)	.891	.678	.213	.000	80.02	4	(H2-1)	
512	T									NON-COM
		(T)	.891	.678	.213	.000	.00	4	(H2-1)	
513	T									NON-COM
		(T)	1.035	.676	.359	.000	80.02	4	(H2-1)	
514	T									NON-COM
		(T)	1.035	.675	.359	.000	.00	4	(H2-1)	
515	T									NON-COM
		(T)	1.117	.580	.537	.000	80.02	4	(H2-1)	
516	T									NON-COM
		(T)	1.117	.580	.537	.000	.00	4	(H2-1)	
517	T									NON-COM
		(T)	1.018	.431	.587	.000	80.02	4	(H2-1)	
518	T									NON-COM
		(T)	1.017	.431	.587	.000	.00	4	(H2-1)	
519	T									NON-COM
		(T)	.820	.233	.587	.000	80.02	4	(H2-1)	
520	T									NON-COM
		(T)	.820	.232	.587	.000	.00	4	(H2-1)	
521	T									NON-COM
		(C)	.666	.019	.647	.000	80.02	4	(H1-3)	
522	T									NON-COM
		(C)	.694	.020	.674	.000	80.02	4	(H1-3)	
523	T									NON-COM
		(C)	1.041	.337	.704	.000	.00	4	(H1-1)	
524	T									NON-COM
		(C)	.815	.337	.478	.000	.00	4	(H1-1)	
525	T									NON-COM

(C)	.815	.337	.478	.000	80.02	4	(H1-1)

Truss T1 Hangars 43 and 47 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
526	T									NON-COM
		(C)	1.041	.337	.704	.000	80.02	4	(H1-1)	
527	T									NON-COM
		(C)	.694	.020	.674	.000	.00	4	(H1-3)	
528	T									NON-COM
		(C)	.666	.019	.647	.000	.00	4	(H1-3)	
529	T									NON-COM
		(T)	.820	.233	.587	.000	80.02	4	(H2-1)	
530	T									NON-COM
		(T)	.820	.233	.587	.000	.00	4	(H2-1)	
531	T									NON-COM
		(T)	1.017	.431	.587	.000	80.02	4	(H2-1)	
532	T									NON-COM
		(T)	1.018	.431	.587	.000	.00	4	(H2-1)	
533	T									NON-COM
		(T)	1.117	.580	.537	.000	80.02	4	(H2-1)	
534	T									NON-COM
		(T)	1.117	.580	.537	.000	.00	4	(H2-1)	
535	T									NON-COM
		(T)	1.035	.675	.359	.000	80.02	4	(H2-1)	
536	T									NON-COM
		(T)	1.035	.676	.359	.000	.00	4	(H2-1)	
537	T									NON-COM
		(T)	.891	.678	.213	.000	80.02	4	(H2-1)	
538	T									NON-COM
		(T)	.891	.679	.213	.000	.00	4	(H2-1)	
539	T									NON-COM
		(T)	1.023	.711	.312	.000	80.02	4	(H2-1)	
540	T									NON-COM
		(T)	1.024	.712	.312	.000	.00	4	(H2-1)	
541	T									NON-COM
		(C)	.512	.322	.191	.000	80.02	1	(H1-1)	
		(T)	1.129	.681	.448	.000	80.02	4	(H2-1)	
542	T									NON-COM
		(C)	.512	.322	.191	.000	.00	1	(H1-1)	
		(T)	1.130	.682	.448	.000	.00	4	(H2-1)	
543	T									NON-COM
		(T)	1.103	.589	.515	.000	80.02	4	(H2-1)	
544	T									NON-COM
		(T)	1.104	.589	.515	.000	.00	4	(H2-1)	
545	T									NON-COM
		(T)	1.024	.424	.600	.000	80.02	4	(H2-1)	
546	T									NON-COM
		(T)	1.025	.425	.600	.000	.00	4	(H2-1)	
547	T									NON-COM
		(T)	.787	.198	.589	.000	.00	4	(H2-1)	
548	T									NON-COM
		(T)	.575	.199	.376	.000	.00	4	(H2-1)	
553	G									NON-COM
		(C)	.538	.402	.136	.000	.00	4	(H1-1)	

Truss T1 Hangars 43 and 47 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
554	G									NON-COM
		(C)	1.029	.768	.261	.000	160.00	4	(H1-1)	
555	T									NON-COM
		(C)	.936	.741	.195	.000	.00	4	(H1-1)	
556	T									NON-COM
		(C)	1.026	.788	.239	.000	160.00	4	(H1-1)	
557	T									NON-COM
		(C)	.746	.571	.175	.000	160.00	4	(H1-1)	
561	G									NON-COM
		(C)	.545	.454	.091	.000	160.00	1	(H1-1)	
		(T)	.935	.861	.074	.000	.00	4	(H2-1)	
562	G									NON-COM
		(C)	.805	.685	.120	.000	.00	1	(H1-1)	
		(T)	1.455	1.393	.062	.000	80.00	4	(H2-1)	
563	G									NON-COM
		(C)	.816	.685	.131	.000	160.00	1	(H1-1)	
		(T)	1.455	1.393	.062	.000	80.00	4	(H2-1)	
564	G									NON-COM
		(T)	.935	.861	.074	.000	160.00	4	(H2-1)	
568	T									NON-COM
		(C)	.746	.571	.175	.000	.00	4	(H1-1)	
569	T									NON-COM
		(C)	1.026	.788	.239	.000	.00	4	(H1-1)	
570	T									NON-COM
		(C)	.936	.741	.195	.000	160.00	4	(H1-1)	
571	G									NON-COM
		(C)	1.029	.768	.261	.000	.00	4	(H1-1)	
572	G									NON-COM
		(C)	.538	.402	.136	.000	160.00	4	(H1-1)	
577	G									NON-COM
		(T)	.756	.756	.000	.000	.00	4	(H2-1)	
578	G			kl/r > 200						NON-COM
		(T)	.570	.570	.000	.000	.00	4	(H2-1)	
579	G			kl/r > 200						NON-COM
580	G			kl/r > 200						NON-COM
581	G			kl/r > 200						NON-COM
582	G			kl/r > 200						NON-COM
583	G			kl/r > 200						NON-COM
		(C)	.645	.645	.000	.000	.00	1	(H1-1)	
584	G			kl/r > 200						NON-COM
		(C)	1.276	1.276	.000	.000	.00	1	(H1-1)	
		(T)	.565	.565	.000	.000	.00	4	(H2-1)	
585	G			kl/r > 200						NON-COM
		(C)	1.313	1.313	.000	.000	.00	1	(H1-1)	
		(T)	.714	.714	.000	.000	.00	4	(H2-1)	
586	G			kl/r > 200						NON-COM
		(C)	1.283	1.283	.000	.000	.00	1	(H1-1)	
		(T)	.683	.683	.000	.000	.00	4	(H2-1)	

Truss T1 Hangars 43 and 47 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
587	G		kl/r > 200							NON-COM
		(C)	1.321	1.321	.000	.000	.00	1	(H1-1)	
		(T)	.811	.811	.000	.000	.00	4	(H2-1)	
588	W14X61									COMPACT
		(T)	.700	.700	.000	.000	200.00	4	(H2-1)	
589	G									NON-COM
		(C)	1.697	1.697	.000	.000	.00	1	(H1-1)	
		(T)	.811	.811	.000	.000	.00	4	(H2-1)	
590	G		kl/r > 200							NON-COM
		(C)	1.588	1.588	.000	.000	.00	1	(H1-1)	
		(T)	.683	.683	.000	.000	.00	4	(H2-1)	
591	G		kl/r > 200							NON-COM
		(C)	1.781	1.781	.000	.000	.00	1	(H1-1)	
		(T)	.714	.714	.000	.000	.00	4	(H2-1)	
592	G		kl/r > 200							NON-COM
		(C)	1.698	1.698	.000	.000	.00	1	(H1-1)	
		(T)	.565	.565	.000	.000	.00	4	(H2-1)	
593	G		kl/r > 200							NON-COM
		(C)	1.052	1.052	.000	.000	.00	1	(H1-1)	
594	G		kl/r > 200							NON-COM
595	G		kl/r > 200							NON-COM
596	G		kl/r > 200							NON-COM
		(C)	.680	.680	.000	.000	.00	1	(H1-1)	
597	G		kl/r > 200							NON-COM
		(C)	1.379	1.379	.000	.000	.00	1	(H1-1)	
598	G		kl/r > 200							NON-COM
		(C)	1.453	1.453	.000	.000	.00	1	(H1-1)	
		(T)	.570	.570	.000	.000	.00	4	(H2-1)	
599	G									NON-COM
		(C)	1.127	1.127	.000	.000	.00	1	(H1-1)	
		(T)	.756	.756	.000	.000	.00	4	(H2-1)	
605	T		kl/r > 200							NON-COM
606	T		kl/r > 200							NON-COM
607	T		kl/r > 200							NON-COM
608	T		kl/r > 200							NON-COM
609	T		kl/r > 200							NON-COM
611	T		kl/r > 200							NON-COM
612	T		kl/r > 200							NON-COM
614	T		kl/r > 200							NON-COM
618	T		kl/r > 200							NON-COM
619	T		kl/r > 200							NON-COM
620	T		kl/r > 200							NON-COM
624	T		kl/r > 200							NON-COM
701	T									NON-COM
		(C)	.962	.869	.093	.000	113.14	4	(H1-1)	
702	T									NON-COM
		(C)	.913	.824	.089	.000	.00	4	(H1-1)	
703	T									NON-COM
		(C)	1.837	1.643	.194	.000	114.32	4	(H1-1)	

Truss T1 Hangars 43 and 47 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
704	T	(C)	1.820	1.629	.190	.000	.00	4	(H1-1)	NON-COM
705	T			fa > Fe						NON-COM
706	T			fa > Fe						NON-COM
707	T			fa > Fe						NON-COM
708	T			fa > Fe						NON-COM
709	2L3X2X5/16-3	(C)	.820	.623	.197	.000	117.95	4	(H1-1)	NON-COM
710	2L3X2X5/16-3	(C)	.594	.450	.145	.000	.00	4	(H1-1)	NON-COM
713	T	(C)	1.054	.771	.283	.000	.00	4	(H1-1)	NON-COM
714	T	(C)	1.181	.850	.331	.000	121.67	4	(H1-1)	NON-COM
715	T			fa > Fe						NON-COM
716	T			fa > Fe						NON-COM
717	T			fa > Fe						NON-COM
718	T			fa > Fe						NON-COM
719	T			fa > Fe						NON-COM
720	T			fa > Fe						NON-COM
721	T			fa > Fe						NON-COM
722	T			fa > Fe						NON-COM
723	T			fa > Fe						NON-COM
724	T			fa > Fe						NON-COM
725	T			fa > Fe						NON-COM
726	T			fa > Fe						NON-COM
727	T			fa > Fe						NON-COM
728	T			fa > Fe						NON-COM
729	T			fa > Fe						NON-COM
730	T			fa > Fe						NON-COM
731	T			fa > Fe						NON-COM
732	T			fa > Fe						NON-COM
733	T			fa > Fe						NON-COM
734	T			fa > Fe						NON-COM
735	T	(C)	1.181	.850	.331	.000	121.67	4	(H1-1)	NON-COM
736	T	(C)	1.054	.771	.283	.000	.00	4	(H1-1)	NON-COM
739	2L3X2X5/16-3	(C)	.595	.450	.145	.000	.00	4	(H1-1)	NON-COM
740	2L3X2X5/16-3	(C)	.820	.623	.197	.000	117.95	4	(H1-1)	NON-COM
741	T			fa > Fe						NON-COM
742	T			fa > Fe						NON-COM
743	T			fa > Fe						NON-COM
744	T			fa > Fe						NON-COM
745	T	(C)	1.820	1.630	.190	.000	.00	4	(H1-1)	NON-COM
746	T	(C)	1.837	1.643	.194	.000	114.32	4	(H1-1)	NON-COM

Truss T1 Hangars 43 and 47 with Knee braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS = RATIO	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
747	T									NON-COM
		(C)	.913	.824	.089	.000	.00	4	(H1-1)	
748	T									NON-COM
		(C)	.962	.869	.093	.000	113.14	4	(H1-1)	
809	W24X68									COMPACT
		(T)	.530	.052	.477	.000	.00	2	(H2-1)	
812	W24X68									COMPACT
		(C)	.821	.020	.801	.000	78.00	1	(H1-3)	
		(T)	.985	.052	.933	.000	78.00	2	(H2-1)	
817	W18X65									COMPACT
		(C)	.890	.005	.885	.000	180.50	2	(H1-3)	
		(T)	.601	.000	.601	.000	180.50	1	(H2-1)	
820	W18X76									COMPACT
		(C)	.884	.084	.800	.000	180.50	1	(H1-3)	
		(T)	.846	.116	.731	.000	180.50	2	(H2-1)	
821	W18X76									COMPACT
		(T)	1.075	.181	.894	.000	108.50	2	(H2-1)	
822	W18X76									COMPACT
		(T)	.558	.090	.467	.000	.00	2	(H2-1)	
823	W18X76									COMPACT
		(T)	.938	.091	.847	.000	.00	2	(H2-1)	
859	W24X68									COMPACT
		(C)	.642	.026	.616	.000	.00	1	(H1-3)	
		(T)	.506	.088	.419	.000	.00	4	(H2-1)	
860	W24X68									COMPACT
		(C)	.506	.026	.480	.000	.00	1	(H1-3)	
862	W24X68									COMPACT
		(C)	.839	.026	.814	.000	78.00	1	(H1-3)	
		(T)	.627	.054	.573	.000	78.00	2	(H2-1)	
867	W18X65									COMPACT
		(C)	1.079	.086	.993	.000	180.50	1	(H1-3)	
871	W18X76									COMPACT
		(C)	.723	.107	.615	.000	180.50	1	(H1-3)	
		(T)	.568	.110	.458	.000	180.50	2	(H2-1)	
872	W18X76									COMPACT
		(C)	.795	.119	.676	.000	108.50	1	(H1-3)	
		(T)	1.074	.215	.860	.000	108.50	4	(H2-1)	
873	W18X76									COMPACT
		(T)	.544	.110	.434	.000	.00	4	(H2-1)	
874	W18X76									COMPACT
		(C)	.685	.043	.642	.000	.00	1	(H1-3)	
		(T)	.933	.114	.818	.000	.00	4	(H2-1)	
998	G									NON-COM
		(T)	.698	.251	.447	.000	.00	2	(H2-1)	
999	G									NON-COM
		(C)	.619	.236	.383	.000	.00	1	(H1-1)	
		(T)	.683	.281	.401	.000	.00	4	(H2-1)	

Truss T2 Hangars 44 and 45 Knee Braces

C SAP90 INPUT

```
system
L=10
C
C
C
joints
C     Truss Joints T2-a
  1   x=0     z=0                               y=0
 49   x=3840  z=0       g=1,49,2
 51   x=0     z=160
 75   x=1920  z=200     g=51,75,1
 99   x=3840  z=160     g=75,99,1
102   x=80    z=80
112   x=880   z=88.3333 g=102,112,2
114   x=1040  z=91.6667
124   x=1840  z=100     g=114,124,2
126   x=2000  z=100
136   x=2800  z=91.6667 g=126,136,2
138   x=2960  z=88.3333
148   x=3760  z=80      g=138,148,2
50    x=0     z=42
100   x=3840  z=42
166   x=1920  z=-384
C     Bracing Frame Joints T2-a
149   x=-390   z=42
150   x=-312   z=42
151   x=-390   z=0
152   x=-312   z=0
153   x=-312   z=-130
154   x=-0     z=-130
155   x=-390   z=-213
156   x=-312   z=-213
157   x=-312   z=-252
158   x=0      z=-252
161   x=-156   z=-65
162   x=-156   z=-191
163   x=-156   z=-318
164   x=-390   z=-384
165   x=-312   z=-384
167   x=0      z=-384
170   x=4152   z=42
171   x=4230   z=42
172   x=4152   z=0
173   x=4230   z=0
174   x=3840   z=-43
178   x=4152   z=-43
179   x=3840   z=-203.5
183   x=4152   z=-203.5
184   x=4230   z=-203.5
185   x=3840   z=-384
186   x=4152   z=-384
187   x=4230   z=-384
```

```
188  x=3996  z=-123.25
189  x=3996  z=-293.75
998  x=0     z=-95    y=0
999  x=3840 z=-95     y=0

restraints
164  r=1,1,1,0,0,0
187  r=1,1,1,0,0,0
165  r=1,1,1,0,0,0
167  r=1,1,1,0,0,0
185  r=1,1,1,0,0,0
186  r=1,1,1,0,0,0
166    r=1,1,1,0,0,0
1 49 2 r=0,1,0,0,0,0
51 99 1 r=0,1,0,0,0,0
149 150 1 r=0,1,0,0,0,0
151 r=0,1,0,0,0,0
155 r=0,1,0,0,0,0
170 174 1  r=0,1,0,0,0,0
178 179 1 r=0,1,0,0,0,0
183 184 1 r=0,1,0,0,0,0

frame
nm=58 nl=18 z=-1,0,0,0,0,0,0,0,0,0
1  sh=216x3.5x3/8-3      w=.00205    E=29000
2  sh=218x6x1/2-3        w=.0038333
3  sh=216x6x3/8-3        w=.00248333
4  sh=213x3.5x5/16-3     w=.0011
5  sh=213x3x1/4-3        w=.00081667
6  sh=216x3.5x5/16-3     w=.0016333
7  sh=213x3x5/16-3       w=.00101667
8  sh=2L3.5X2.5X5/16-3   w=.001008333
9  sh=213x2.5x1/4-3      w=.00075
10 sh=213x2x5/16-3       w=.0008333
11 sh=216x6x1/2-3        w=.0030667
12 sh=218x6x1/2-3        w=.0038333
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
```

```
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=s10x35             w=.004
58 sh=218x8x1/2
C      Live Load on braced frames
1 wg=0,0,-.08333     :100 psf---T2
C      Slab load on braced frames
2 wg=0,0,-.041667    :150pcfx4 in. ---T2
C       Roof Dead Loads
3 wg=0,0,-.0025
C       Roof Live Loads
4 wg=0,0,-.01667
C        Wind Span Loads
5  wg=.048333,0,0
6  wg=.0508333,0,0
7  wg=.0033,0,0
8  wg=-.011667,0,0
9  wg=.06,0,0
10 wg=-.015,0,0
11 wg=.015,0,0
12 wg=-.071667,0,0
13 wg=.071667,0,0
14 wg=-.048333,0,0
15 wg=-.0508333,0,0
16 wg=-.0033,0,0
17 wg=.011667,0,0
18 wg=-.06,0,0
C          Truss Elements T2-a
385  166  25   m=34 lp=2,0
88   25   75   m=34 lp=2,0
C              Bottom Chord (3 axis --- +Y)
51   1    3    m=11 lp=2,0 lr=1,0,0,0,0,0
52   3    5    m=11 lp=2,0         g=2,1,2,2
55   9    11   m=21 lp=2,0         g=3,1,2,2
59   17   19   m=11 lp=2,0         g=2,1,2,2
62   23   25   m=11 lp=2,0 lr=0,1,0,0,0,0
```

```
63    25    27    m=11 lp=2,0 lr=1,0,0,0,0,0
64    27    29    m=11 lp=2,0        g=2,1,2,2
67    33    35    m=21 lp=2,0        g=3,1,2,2
71    41    43    m=11 lp=2,0        g=2,1,2,2
74    47    49    m=11 lp=2,0 lr=0,1,0,0,0,0
C                Main Diagonal Bottom Section
202   102   3     m=14 lp=2,0 lr=0,1,0,0,0,0
204   104   5     m=6  lp=2,0 lr=0,1,0,0,0,0
206   106   7     m=15 lp=2,0 lr=0,1,0,0,0,0
208   108   9     m=8  lp=2,0 lr=0,1,0,0,0,0
210   110   11    m=9  lp=2,0 lr=0,1,0,0,0,0
212   112   13    m=13 lp=2,0 lr=0,1,0,0,0,0
213   114   13    m=10 lp=-2,0 lr=0,1,0,0,0,0
215   116   15    m=9  lp=-2,0 lr=0,1,0,0,0,0
217   118   17    m=8  lp=-2,0 lr=0,1,0,0,0,0
219   120   19    m=13 lp=-2,0 lr=0,1,0,0,0,0
221   122   21    m=6  lp=-2,0 lr=0,1,0,0,0,0
223   124   23    m=1  lp=-2,0 lr=0,1,0,0,0,0
226   126   27    m=1  lp=2,0 lr=0,1,0,0,0,0
228   128   29    m=6  lp=2,0 lr=0,1,0,0,0,0
230   130   31    m=13 lp=2,0 lr=0,1,0,0,0,0
232   132   33    m=8  lp=2,0 lr=0,1,0,0,0,0
234   134   35    m=9  lp=2,0 lr=0,1,0,0,0,0
236   136   37    m=10 lp=2,0 lr=0,1,0,0,0,0
237   138   37    m=13 lp=-2,0 lr=0,1,0,0,0,0
239   140   39    m=9  lp=-2,0 lr=0,1,0,0,0,0
241   142   41    m=8  lp=-2,0 lr=0,1,0,0,0,0
243   144   43    m=15 lp=-2,0 lr=0,1,0,0,0,0
245   146   45    m=6  lp=-2,0 lr=0,1,0,0,0,0
247   148   47    m=14 lp=-2,0 lr=0,1,0,0,0,0
C                Main Diagonal Top section
201   51    102   m=14 lp=2,0 lr=1,0,0,0,0,0
203   53    104   m=6  lp=2,0 lr=1,0,0,0,0,0
205   55    106   m=15 lp=2,0 lr=1,0,0,0,0,0
207   57    108   m=8  lp=2,0 lr=1,0,0,0,0,0
209   59    110   m=9  lp=2,0 lr=1,0,0,0,0,0
211   61    112   m=13 lp=2,0 lr=1,0,0,0,0,0
214   65    114   m=10 lp=-2,0 lr=1,0,0,0,0,0
216   67    116   m=9  lp=-2,0 lr=1,0,0,0,0,0
218   69    118   m=8  lp=-2,0 lr=1,0,0,0,0,0
220   71    120   m=13 lp=-2,0 lr=1,0,0,0,0,0
222   73    122   m=6  lp=-2,0 lr=1,0,0,0,0,0
224   75    124   m=1  lp=-2,0  lr=1,0,0,0,0,0
225   75    126   m=1  lp=2,0   lr=1,0,0,0,0,0
227   77    128   m=6  lp=2,0 lr=1,0,0,0,0,0
229   79    130   m=13 lp=2,0 lr=1,0,0,0,0,0
231   81    132   m=8  lp=2,0 lr=1,0,0,0,0,0
233   83    134   m=9  lp=2,0 lr=1,0,0,0,0,0
235   85    136   m=10 lp=2,0 lr=1,0,0,0,0,0
238   89    138   m=13 lp=-2,0 lr=1,0,0,0,0,0
240   91    140   m=9  lp=-2,0 lr=1,0,0,0,0,0
242   93    142   m=8  lp=-2,0 lr=1,0,0,0,0,0
244   95    144   m=15 lp=-2,0 lr=1,0,0,0,0,0
246   97    146   m=6  lp=-2,0 lr=1,0,0,0,0,0
248   99    148   m=14 lp=-2,0 lr=1,0,0,0,0,0
C                Diagonal Brace
126   53    102   m=5  lp=2,0      g=5,1,2,2 lr=1,1,0,0,0,0
```

```
132  63    114  m=5   lp=-2,0       g=5,1,2,2 lr=1,1,0,0,0,0
138  77    126  m=5   lp=2,0        g=5,1,2,2 lr=1,1,0,0,0,0
144  87    138  m=5   lp=-2,0       g=5,1,2,2 lr=1,1,0,0,0,0
C              Vertical Brace
101  102   52   m=5   lp=2,0    g=10,1,2,2 lr=1,1,0,0,0,0
112  124   74   m=22 lp=2,0  lr=1,1,0,0,0,0
113  126   76   m=22 lp=-2,0  lr=1,1,0,0,0,0
114  128   78   m=5   lp=-2,0   g=10,1,2,2 lr=1,1,0,0,0,0
C               Top Chord (3 axis ------  -Z)
1    51    52   m=12  lp=-2,0 lr=1,0,0,0,0,0
2    52    53   m=12  lp=-2,0         g=21,1,1,1
24   74    75   m=12  lp=-2,0 lr=0,1,0,0,0,0
25   75    76   m=12  lp=-2,0 lr=1,0,0,0,0,0
26   76    77   m=12  lp=-2,0         g=21,1,1,1
48   98    99   m=12  lp=-2,0 lr=0,1,0,0,0,0
C              South Vertical Member
76   50    51   m=20 lp=2,0 nsl=0,0,6,8,0,0,10,12,16,18 \
                                          lr=1,1,0,0,0,0
50   1     50   m=20 lp=2,0 nsl=0,0,6,8,0,0,10,12,16,18 \
                                          lr=1,1,0,0,0,0
77   3     53   m=14 lp=2,0     g=1,1,2,2 lr=1,1,0,0,0,0
79   7     57   m=6   lp=2,0    g=5,1,2,2 lr=1,1,0,0,0,0
85   19    69   m=14 lp=2,0     g=2,1,2,2 lr=1,1,0,0,0,0
89   27    77   m=14 lp=-2,0    g=2,1,2,2 lr=1,1,0,0,0,0
92   33    83   m=6   lp=-2,0   g=5,1,2,2 lr=1,1,0,0,0,0
98   45    95   m=14 lp=-2,0    g=1,1,2,2 lr=1,1,0,0,0,0
100  100   99   m=20 lp=2,0 nsl=0,0,7,9,0,0,11,13,15,17 \
                                          lr=1,1,0,0,0,0
49   49   100   m=20 lp=2,0 nsl=0,0,7,9,0,0,11,13,15,17 \
                                          lr=1,1,0,0,0,0
C       Bracing Frame Elements
301 149   150  m=23   lp=2,0
302 150   50   m=24   lp=2,0
303 151   152  m=25   lp=2,0
304 152   1    m=26   lp=2,0
305 153   154  m=57   lp=2,0
306 155   156  m=25   lp=2,0
307 157   158  m=57   lp=2,0
310 164   155  m=27   lp=3,0
311 155   151  m=27   lp=3,0
316 151   149  m=27   lp=3,0
319 152   150  m=19   lp=2,0
312 165   157  m=19   lp=2,0
314 157   156  m=19   lp=2,0
315 156   153  m=19   lp=2,0
317 153   152  m=19   lp=2,0
318 167   158  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
320 158   154  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
321 998     1  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
340 154   998  m=20   lp=2,0     nsl=0,0,5,8,0,0,10,12,16,18
322 153   161  m=8    lp=2,0
323 161     1  m=8    lp=2,0
324 152   161  m=8    lp=2,0
325 161   154  m=8    lp=2,0
326 157   162  m=8    lp=2,0
327 162   154  m=8    lp=2,0
328 153   162  m=8    lp=2,0
```

```
329 162  158  m=8   lp=2,0
330 165  163  m=8   lp=2,0
331 163  158  m=8   lp=2,0
332 157  163  m=8   lp=2,0
333 163  167  m=8   lp=2,0
351 100  170  m=24  lp=2,0
352 170  171  m=23  lp=2,0
353 49   172  m=26  lp=2,0
354 172  173  m=25  lp=2,0
355 174  178  m=26  lp=2,0  nsl=3,0,0,0,0,4,0,0,0,0
359 179  183  m=19  lp=2,0  nsl=2,1,0,0,0,0,0,0,0,0
363 183  184  m=25  lp=2,0
364 187  184  m=27  lp=3,0
365 184  173  m=27  lp=3,0
366 173  171  m=27  lp=3,0
367 186  183  m=19  lp=2,0  nsl=0,0,7,9,0,0,11,13,14,17
368 183  178  m=19  lp=2,0  nsl=0,0,7,9,0,0,11,13,14,17
369 178  172  m=19  lp=2,0
370 172  170  m=19  lp=2,0
371 185  179  m=20  lp=2,0
372 179  999  m=20  lp=2,0
384 999  174  m=20  lp=2,0
373 174  49   m=20  lp=2,0  nsl=0,0,7,9,0,0,11,13,14,17
374 174  188  m=8   lp=-2,0
375 188  183  m=8   lp=-2,0
376 179  188  m=8   lp=-2,0
377 188  178  m=8   lp=-2,0
378 179  189  m=8   lp=-2,0
379 189  186  m=8   lp=-2,0
380 185  189  m=8   lp=-2,0
381 189  183  m=8   lp=-2,0
C
C Knee Braces
998 998  3 m=58 lp=2,0
999 999 47 m=58 lp=2,0

loads
51 99 48 l=1 f=0,0,-.376
52 54  1 l=1 f=0,0,-.737
55       l=1 f=0,0,-.832
56 58 1  l=1 f=0,0,-.737
59       l=1 f=0,0,-.832
60 62 1  l=1 f=0,0,-.737
63       l=1 f=0,0,-.952
64 66 1  l=1 f=0,0,-.737
67       l=1 f=0,0,-.832
68 70 1  l=1 f=0,0,-.737
71       l=1 f=0,0,-.832
72 74 1  l=1 f=0,0,-.737
75       l=1 f=0,0,-1.46
76 78 1  l=1 f=0,0,-.737
79       l=1 f=0,0,-.832
80 82 1  l=1 f=0,0,-.737
83       l=1 f=0,0,-.832
84 86 1  l=1 f=0,0,-.737
87       l=1 f=0,0,-.952
88 90 1  l=1 f=0,0,-.737
```

```
91          l=1  f=0,0,-.832
92 94 1     l=1  f=0,0,-.737
95          l=1  f=0,0,-.832
96 98 1     l=1  f=0,0,-.737
51 99 48 l=1 f=0,0,-.3
52 98 1     l=1  f=0,0,-.6
51  99 48 l=1 f=0,0,-.347
55 59 4     l=1 f=0,0,-.557
63 87 24    l=1 f=0,0,-.322
67 71 4     l=1 f=0,0,-.557
75          l=1 f=0,0,-.163
79 83 4     l=1 f=0,0,-.557
91 95 4     l=1 f=0,0,-.557
9 17 8      l=1 f=0,0,-.1775
33 41 8     l=1 f=0,0,-.1775
51 99 48    l=6 f=0,0,-.66667
52 98 1     l=6 f=0,0,-1.3333
1 49 48     l=2 f=0,0,-.533
3 23 2      l=2 f=0,0,-1.066
27 47 2     l=2 f=0,0,-1.066
155         l=3 f=12.11,0,0
184         l=3 f=.83,0,0
155         l=4 f=2.91,0,0
184         l=4 f=15,0,0
51          l=3 f=0,0,.867
52 57 1     l=3 f=0,0,1.73
58          l=3 f=0,0,.833
59 64 1     l=3 f=0,0,.533
65 98 1     l=3 f=0,0,-.2
99          l=3 f=0,0,-.1
51          l=4 f=0,0,3.13
52 57 1     l=4 f=0,0,6.27
58          l=4 f=0,0,5.37
59 64 1     l=4 f=0,0,5.07
65 98 1     l=4 f=0,0,4.33
99          l=4 f=0,0,2.17
3 23 2      l=5 f=0,0,-.5
27 47 2     l=5 f=0,0,-.5
155         l=7 f=-3.74,0,0
184         l=7 f=3.74,0,0
155         l=8 f=-17.9,0,0
184         l=8 f=17.9,0,0
51          l=7 f=0,0,.967
52 98 1     l=7 f=0,0,1.933
99          l=7 f=0,0,.967
51          l=8 f=0,0,3.2
52 98 1     l=8 f=0,0,6.4
99          l=8 f=0,0,3.2
184         l=9 f=-12.11,0,0
155         l=9 f=-.83,0,0
99          l=9 f=0,0,.867
93 98 1     l=9 f=0,0,1.73
92          l=9 f=0,0,.833
86 91 1     l=9 f=0,0,.533
52 85 1     l=9 f=0,0,-.2
51          l=9 f=0,0,-.1
184         l=10 f=2.91,0,0
```

```
155        l=10 f=-15,0,0
99         l=10 f=0,0,3.13
93 98 1    l=10 f=0,0,6.27
92         l=10 f=0,0,5.37
86 91 1    l=10 f=0,0,5.07
52 85 1    l=10 f=0,0,4.33
51         l=10 f=0,0,2.17
```

Truss T2 Hangars 44 and 45 Knee Braces

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,0,0,0,0
2 c=1,0,0,1,1,0,0,0,0,0
3 c=1,0,0,0,1,0,1,0,0,0
4 c=1,0,0,0,1,0,0,1,0,0
5 c=1,0,0,0,1,0,0,0,1,0
6 c=1,0,0,0,1,0,0,0,0,1

sections
59 mn=s sh=t e=29000 fy=36 t=8,12,.5,1             :2L8x6x1/2
60 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5            :2L3x2.5x1/4
61 mn=s sh=g e=29000 fy=36 a=5.74 i=16.0,28.0 \
 as=2.97,2.97 z=9.03,8.04   t=9.23,10.8            :2L6x3.5x5/16-odd
62 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.75 \
 as=3.75,3.75 z=11.34,10.25 t=9.13,11              :2L6x4x3/8-odd
63 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5            :2L3x2x1/4
64 mn=s sh=w14x90 e=29000
65 mn=s sh=w14x90 e=29000
66 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625        :2L4x3x5/16
67 mn=s sh=t e=29000 fy=36 t=5,6,.25,.5            :2L5x3x1/4
68 mn=s sh=w14x90 e=29000
69 mn=s sh=t e=29000 fy=36 t=6,12,.5,1             :2L6x6x1/2
70 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
71 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5            :2L3x2.5x1/4
72 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625        :2L3x2x5/16
73 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.93 \
 as=3.8,2.2 z=9.7,5.5 t=7.98,7.375                 :2L6x3.5x5/16
74 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,92.4 \
 as=8,8 z=30.1,36.9 t=11.65,16.37                  :2L8x8x1/2
75 mn=s sh=g e=29000 fy=36 a=16.29 i=147,277   \
  as=6.7,2.4 z=55.6,28.3 t=16.7,12.35              :2C-12x40,10x15.3
76 mn=s sh=t e=29000 fy=36 t=6,12,.6875,1.375 :2L6x6x11/16
77 mn=s sh=t e=29000 fy=36 t=6,7,.375,.75          :2L6x3.5x3/8

frame
223 226 1 m=77
1  48 1 m=59
51 54 1 m=69
55 58 1 m=76
67 70 1 m=76
207     m=70
242     m=70
223 226 1 m=69
71 74 1 m=69
62 63 1 m=69
77 78 1 m=62 l=1,.5
79      m=73 l=1,.5
80 84 1 m=61 l=1,.5
85 87 1 m=62 l=1,.5
89 91 1 m=62 l=1,.5
```

```
92 96 1 m=61 l=1,.5
97       m=73 l=1,.5
98 99 1 m=62 l=1,.5
241      m=70
208      m=70
209      m=71
101 124 1 m=60
126 149 1 m=63
201 202 1 m=62
203 204 1 m=76
205 206 1 m=67
211 212 1 m=66
213 214 1 m=72
215        m=71
216        m=71
217 218 1 m=70
219 220 1 m=66
221 222 1 m=73
227 228 1 m=73
229 230 1 m=66
231 232 1 m=70
233 234 1 m=71
235 236 1 m=72
237 238 1 m=66
243 244 1 m=67
245 246 1 m=73
247 248 1 m=62
374 381 1 m=70
385        l=.5,.5
371        l=1,.001
367 368 1 l=1,.001
355 359 4 l=1,.001
322 333 1 m=70
318        l=1,.001
320 321 1 l=1,.001
340        l=1,.001
384        l=1,.001
305 307 2 m=75
998 999 1 m=74
```

Truss T2 Hangars 44 and 45 Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
205	T	(C)	.724	.615	.109	.000	115.52	4	(H1-1)	NON-COM
206	T	(C)	.703	.595	.108	.000	.00	4	(H1-1)	NON-COM
207	T	(C)	.602	.498	.104	.000	116.73	4	(H1-1)	NON-COM
208	T	(C)	.562	.462	.099	.000	.00	4	(H1-1)	NON-COM
213	T	(C)	.825	.710	.115	.000	.00	4	(H1-1)	NON-COM
214	T	(C)	.938	.807	.130	.000	121.67	4	(H1-1)	NON-COM
215	T	(C)	2.711	.956	1.756	.000	.00	4	(H1-1)	NON-COM
216	T	(C)	11.061	.992	10.068	.000	122.93	4	(H1-1)	NON-COM
217	T	(C)	1.245	.961	.284	.000	.00	4	(H1-1)	NON-COM
218	T	(C)	1.276	.978	.299	.000	124.20	4	(H1-1)	NON-COM
219	T	(C)	1.012	.797	.214	.000	.00	4	(H1-1)	NON-COM
220	T	(C)	1.026	.807	.219	.000	125.48	4	(H1-1)	NON-COM
221	G	(C)	.712	.599	.112	.000	.00	4	(H1-1)	NON-COM
222	G	(C)	.721	.608	.113	.000	126.77	4	(H1-1)	NON-COM
227	G	(C)	.732	.617	.115	.000	126.77	4	(H1-1)	NON-COM
228	G	(C)	.723	.609	.115	.000	.00	4	(H1-1)	NON-COM
229	T	(C)	1.050	.822	.229	.000	125.48	4	(H1-1)	NON-COM
230	T	(C)	1.037	.813	.224	.000	.00	4	(H1-1)	NON-COM
231	T	(C)	1.326	1.001	.325	.000	124.20	4	(H1-1)	NON-COM
232	T	(C)	1.296	.986	.310	.000	.00	4	(H1-1)	NON-COM
233	T			fa > Fe						NON-COM
234	T	(C)	9.502	.991	8.512	.000	.00	4	(H1-1)	NON-COM
235	T	(C)	.994	.852	.141	.000	121.67	4	(H1-1)	NON-COM
236	T	(C)	.881	.758	.124	.000	.00	4	(H1-1)	NON-COM
241	T	(C)	.534	.437	.096	.000	.00	4	(H1-1)	NON-COM

Truss T2 Hangars 44 and 45 Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
242	T									NON-COM
		(C)	.575	.474	.101	.000	116.73	4	(H1-1)	
243	T									NON-COM
		(C)	.682	.576	.107	.000	.00	4	(H1-1)	
244	T									NON-COM
		(C)	.703	.596	.108	.000	115.52	4	(H1-1)	
245	G									NON-COM
		(C)	.537	.438	.098	.000	.00	4	(H1-1)	
246	G									NON-COM
		(C)	.547	.448	.099	.000	114.32	4	(H1-1)	
302	W12X22			1/r > 300						COMPACT
		(C)	1.048	.802	.246	.000	.00	4	(H1-1)	
304	W14X30			kl/r > 200						COMPACT
326	T									NON-COM
		(C)	.875	.711	.164	.000	.00	5	(H1-1)	
327	T									NON-COM
		(C)	.808	.685	.123	.000	.00	5	(H1-1)	
328	T									NON-COM
		(C)	.504	.425	.078	.000	167.50	2	(H1-1)	
329	T									NON-COM
		(C)	.550	.452	.099	.000	.00	2	(H1-1)	
330	T									NON-COM
		(C)	.861	.711	.150	.000	.00	6	(H1-1)	
331	T									NON-COM
		(C)	.795	.686	.109	.000	169.39	6	(H1-1)	
332	T									NON-COM
		(C)	.642	.542	.100	.000	169.39	1	(H1-1)	
333	T									NON-COM
		(C)	.709	.567	.142	.000	169.39	1	(H1-1)	
351	W12X22			kl/r > 200						COMPACT
		(C)	1.088	.802	.286	.000	312.00	4	(H1-1)	
353	W14X30			kl/r > 200						COMPACT
374	T									NON-COM
		(C)	.607	.425	.182	.000	.00	1	(H1-1)	
375	T									NON-COM
		(C)	.541	.450	.091	.000	.00	1	(H1-1)	
378	T									NON-COM
		(C)	1.183	.915	.268	.000	180.23	1	(H1-1)	
379	T									NON-COM
		(C)	1.258	.939	.319	.000	180.23	1	(H1-1)	
380	T									NON-COM
		(C)	.944	.739	.205	.000	.00	5	(H1-1)	
381	T									NON-COM
		(C)	.847	.713	.134	.000	.00	5	(H1-1)	

Truss T2 Hangars 43 and 47 Knee Braces

C SAP90 INPUT

```
system
L=8
C
C
C
joints
C      Truss Joints T2-a
166 x=1920  z=-384  y=0
  1  x=0    z=0                        y=0
 49  x=3840 z=0       g=1,49,2
 51  x=0    z=160
 75  x=1920 z=200     g=51,75,1
 99  x=3840 z=160     g=75,99,1
102  x=80   z=80
112  x=880  z=88.3333 g=102,112,2
114  x=1040 z=91.6667
124  x=1840 z=100     g=114,124,2
126  x=2000 z=100
136  x=2800 z=91.6667 g=126,136,2
138  x=2960 z=88.3333
148  x=3760 z=80      g=138,148,2
50   x=0    z=42
100  x=3840 z=42
998  x=0    z=-95    y=0
999  x=3840 z=-95    y=0
C      Bracing Frame Joints T2-a
149  x=-390  z=42
150  x=-312  z=42
151  x=-390  z=0
152  x=-312  z=0
153  x=-312  z=-43
154  x=-234  z=-43
155  x=-156  z=-43
156  x=-78   z=-43
157  x=0     z=-43
158  x=-390  z=-203.5
159  x=-312  z=-203.5
163  x=0     z=-203.5  g=159,163,1
164  x=-390  z=-384
165  x=-312  z=-384
167  x=0     z=-384
168  x=-156  z=-123.25
169  x=-156  z=-293.75
170  x=4152  z=42
171  x=4230  z=42
172  x=4152  z=0
173  x=4230  z=0
174  x=3840  z=-43
178  x=4152  z=-43     g=174,178,1
179  x=3840  z=-203.5
183  x=4152  z=-203.5  g=179,183,1
184  x=4230  z=-203.5
```

```
185  x=3840  z=-384
186  x=4152  z=-384
187  x=4230  z=-384
188  x=3996  z=-123.25
189  x=3996  z=-293.75

restraints
164  r=1,1,1,0,0,0
187  r=1,1,1,0,0,0
165  r=1,1,1,0,0,0
167  r=1,1,1,0,0,0
185  r=1,1,1,0,0,0
186  r=1,1,1,0,0,0
166  r=1,1,1,0,0,0
1 49 2 r=0,1,0,0,0,0
51 99 1 r=0,1,0,0,0,0
149 163 1 r=0,1,0,0,0,0
170 184 1  r=0,1,0,0,0,0

frame
nm=57 n1=13 z=-1,0,0,0,0,0,0,0
1  sh=216x3.5x3/8-3     w=.00205     E=29000
2  sh=218x6x1/2-3       w=.0038333
3  sh=216x6x3/8-3       w=.00248333
4  sh=213x3.5x5/16-3    w=.0011
5  sh=213x3x1/4-3       w=.00081667
6  sh=216x3.5x5/16-3    w=.0016333
7  sh=213x3x5/16-3      w=.00101667
8  sh=2L3.5X2.5X5/16-3  w=.001008333
9  sh=213x2.5x1/4-3     w=.00075
10 sh=213x2x5/16-3      w=.0008333
11 sh=216x6x1/2-3       w=.0030667
12 sh=218x6x1/2-3       w=.0038333
13 sh=214x3x5/16-3      w=.0012
14 sh=216x4x3/8-3       w=.00205
15 sh=215x3x1/4-3       w=.0011
16 sh=215x3.5x5/16-3    w=.00145
17 sh=w18x65            w=.00541667
18 sh=w24x68            w=.005667
19 sh=w18x46            w=.0038333
20 sh=w18x65            w=.00541667
21 sh=216x6x5/8-3       w=.0040333
22 sh=213x2.5x1/4-3     w=.00075
23 sh=w8x18             w=.0015
24 sh=w12x22            w=.0018333
25 sh=w10x22            w=.0018333
26 sh=w14x30            w=.0025
27 sh=w8x31             w=.00258333
28 sh=w12x26            w=.0021667
29 sh=w10x12            w=.001
30 sh=w10x22            w=.0018333
31 sh=14x3x1/4          w=.00048333
32 sh=13.5x2.5x1/4      w=.000408333
33 sh=215x3.5x3/8-3     w=.0017333
34 sh=w14x90            w=.0075
35 sh=w14x145           w=.01208333
36 sh=w33x201           w=.01675
```

```
37 sh=217x4x1/2           w=.00298
38 sh=w14x74              w=.0061667
39 sh=w14x43              w=.00358333
40 sh=215x3x5/16          w=.0013667
41 sh=s12x50              w=.0041667
42 sh=w14x61              w=.00508333
43 sh=w6x16               w=.001333
44 sh=213x2.5x1/4-3       w=.00075
45 sh=mc12x31             w=.00258333
46 sh=mc12x31             w=.00258333
47 sh=mc12x31             w=.00258333
48 sh=216x3.5x3/8-3       w=.00195
49 sh=215x3x5/16-3        w=.0013667
50 sh=215x5x3/8           w=.00205
51 sh=13x2.5x1/4          w=.000375
52 sh=13x2x1/4            w=.000341667
53 sh=w14x30              w=.0025
54 sh=215x3.5x5/16-3      w=.00145
55 sh=w14x34              w=.0028333
56 sh=14x3x5/16           w=.0006
57 sh=2L8x8x1/2
C       Live Load on braced frames
1 wg=0,0,-.08333     :100 psf---T2
C       Slab load on braced frames
2 wg=0,0,-.041667    :150pcfx4 in. ---T2
C         Roof Dead Loads
3 wg=0,0,-.0025
C         Roof Live Loads
4 wg=0,0,-.016667
C          Wind Span Loads
5  wg=.048333,0,0
6  wg=.0508333,0,0
7  wg=.0033,0,0
8  wg=-.011667,0,0
9  wg=.06,0,0
10 wg=-.015,0,0
11 wg=.015,0,0
12 wg=-.071667,0,0
13 wg=.071667,0,0
C            Truss Elements T2-a
385  166  25    m=34 lp=2,0
88   25   75    m=34 lp=2,0
C                   Bottom Chord (3 axis --- +Y)
51   1    3     m=11 lp=2,0 lr=1,0,0,0,0,0
52   3    5     m=11 lp=2,0         g=2,1,2,2
55   9    11    m=21 lp=2,0         g=3,1,2,2
59   17   19    m=11 lp=2,0         g=2,1,2,2
62   23   25    m=11 lp=2,0 lr=0,1,0,0,0,0
63   25   27    m=11 lp=2,0 lr=1,0,0,0,0,0
64   27   29    m=11 lp=2,0         g=2,1,2,2
67   33   35    m=21 lp=2,0         g=3,1,2,2
71   41   43    m=11 lp=2,0         g=2,1,2,2
74   47   49    m=11 lp=2,0 lr=0,1,0,0,0,0
C                  Main Diagonal Bottom Section
202  102  3     m=14 lp=2,0 lr=0,1,0,0,0,0
204  104  5     m=6  lp=2,0 lr=0,1,0,0,0,0
206  106  7     m=15 lp=2,0 lr=0,1,0,0,0,0
```

```
208  108  9    m=8  lp=2,0 lr=0,1,0,0,0,0
210  110  11   m=9  lp=2,0 lr=0,1,0,0,0,0
212  112  13   m=13 lp=2,0 lr=0,1,0,0,0,0
213  114  13   m=10 lp=-2,0 lr=0,1,0,0,0,0
215  116  15   m=9  lp=-2,0 lr=0,1,0,0,0,0
217  118  17   m=8  lp=-2,0 lr=0,1,0,0,0,0
219  120  19   m=13 lp=-2,0 lr=0,1,0,0,0,0
221  122  21   m=6  lp=-2,0 lr=0,1,0,0,0,0
223  124  23   m=1  lp=-2,0 lr=0,1,0,0,0,0
226  126  27   m=1  lp=2,0 lr=0,1,0,0,0,0
228  128  29   m=6  lp=2,0 lr=0,1,0,0,0,0
230  130  31   m=13 lp=2,0 lr=0,1,0,0,0,0
232  132  33   m=8  lp=2,0 lr=0,1,0,0,0,0
234  134  35   m=9  lp=2,0 lr=0,1,0,0,0,0
236  136  37   m=10 lp=2,0 lr=0,1,0,0,0,0
237  138  37   m=13 lp=-2,0 lr=0,1,0,0,0,0
239  140  39   m=9  lp=-2,0 lr=0,1,0,0,0,0
241  142  41   m=8  lp=-2,0 lr=0,1,0,0,0,0
243  144  43   m=15 lp=-2,0 lr=0,1,0,0,0,0
245  146  45   m=6  lp=-2,0 lr=0,1,0,0,0,0
247  148  47   m=14 lp=-2,0 lr=0,1,0,0,0,0
C              Main Diagonal Top section
201  51   102  m=14 lp=2,0 lr=1,0,0,0,0,0
203  53   104  m=6  lp=2,0 lr=1,0,0,0,0,0
205  55   106  m=15 lp=2,0 lr=1,0,0,0,0,0
207  57   108  m=8  lp=2,0 lr=1,0,0,0,0,0
209  59   110  m=9  lp=2,0 lr=1,0,0,0,0,0
211  61   112  m=13 lp=2,0 lr=1,0,0,0,0,0
214  65   114  m=10 lp=-2,0 lr=1,0,0,0,0,0
216  67   116  m=9  lp=-2,0 lr=1,0,0,0,0,0
218  69   118  m=8  lp=-2,0 lr=1,0,0,0,0,0
220  71   120  m=13 lp=-2,0 lr=1,0,0,0,0,0
222  73   122  m=6  lp=-2,0 lr=1,0,0,0,0,0
224  75   124  m=1  lp=-2,0  lr=1,0,0,0,0,0
225  75   126  m=1  lp=2,0   lr=1,0,0,0,0,0
227  77   128  m=6  lp=2,0 lr=1,0,0,0,0,0
229  79   130  m=13 lp=2,0 lr=1,0,0,0,0,0
231  81   132  m=8  lp=2,0 lr=1,0,0,0,0,0
233  83   134  m=9  lp=2,0 lr=1,0,0,0,0,0
235  85   136  m=10 lp=2,0 lr=1,0,0,0,0,0
238  89   138  m=13 lp=-2,0 lr=1,0,0,0,0,0
240  91   140  m=9  lp=-2,0 lr=1,0,0,0,0,0
242  93   142  m=8  lp=-2,0 lr=1,0,0,0,0,0
244  95   144  m=15 lp=-2,0 lr=1,0,0,0,0,0
246  97   146  m=6  lp=-2,0 lr=1,0,0,0,0,0
248  99   148  m=14 lp=-2,0 lr=1,0,0,0,0,0
C              Diagonal Brace
126  53   102  m=5  lp=2,0 lr=1,1,0,0,0,0       g=5,1,2,2
132  63   114  m=5  lp=-2,0  lr=1,1,0,0,0,0     g=5,1,2,2
138  77   126  m=5  lp=2,0     lr=1,1,0,0,0,0   g=5,1,2,2
144  87   138  m=5  lp=-2,0    lr=1,1,0,0,0,0   g=5,1,2,2
C              Vertical Brace
101  102  52   m=5  lp=2,0    lr=1,1,0,0,0,0 g=10,1,2,2
112  124  74   m=22 lp=2,0 lr=1,1,0,0,0,0
113  126  76   m=22 lp=-2,0 lr=1,1,0,0,0,0
114  128  78   m=5  lp=-2,0   lr=1,1,0,0,0,0 g=10,1,2,2
C               Top Chord (3 axis ------   -Z)
```

```
1     51    52    m=12  lp=-2,0 lr=1,0,0,0,0,0
2     52    53    m=12  lp=-2,0       g=21,1,1,1
24    74    75    m=12  lp=-2,0 lr=0,1,0,0,0,0
25    75    76    m=12  lp=-2,0 lr=1,0,0,0,0,0
26    76    77    m=12  lp=-2,0       g=21,1,1,1
48    98    99    m=12  lp=-2,0 lr=0,1,0,0,0,0
C                South Vertical Member
76    50    51    m=20 lp=2,0  nsl=0,0,6,8,0,0,10,12 lr=1,1,0,0,0,0
50    1     50    m=20 lp=2,0  nsl=0,0,6,8,0,0,10,12 lr=1,1,0,0,0,0
77    3     53    m=14 lp=2,0          g=1,1,2,2 lr=1,1,0,0,0,0
79    7     57    m=6  lp=2,0          g=5,1,2,2 lr=1,1,0,0,0,0
85    19    69    m=14 lp=2,0          g=2,1,2,2 lr=1,1,0,0,0,0
89    27    77    m=14 lp=-2,0         g=2,1,2,2 lr=1,1,0,0,0,0
92    33    83    m=6  lp=-2,0         g=5,1,2,2 lr=1,1,0,0,0,0
98    45    95    m=14 lp=-2,0         g=1,1,2,2 lr=1,1,0,0,0,0
100   100   99    m=20 lp=2,0  nsl=0,0,7,9,0,0,11,13 lr=1,1,0,0,0,0
49    49    100   m=20 lp=2,0  nsl=0,0,7,9,0,0,11,13 lr=1,1,0,0,0,0
C       Bracing Frame Elements
301 149   150   m=23   lp=2,0
302 150   50    m=24   lp=2,0
303 151   152   m=25   lp=2,0
304 152   1     m=26   lp=2,0
305 153   154   m=26   lp=2,0   nsl=3,0,0,0,0,4,0,0  g=3,1,1,1
309 159   160   m=19   lp=2,0   nsl=2,1,0,0,0,0,0,0  g=3,1,1,1
313 158   159   m=25   lp=2,0
314 164   158   m=27   lp=3,0
315 158   151   m=27   lp=3,0
316 151   149   m=27   lp=3,0
317 165   159   m=19   lp=2,0   nsl=0,0,5,8,0,0,10,12
318 159   153   m=19   lp=2,0   nsl=0,0,5,8,0,0,10,12
331 153   152   m=19   lp=2,0
319 152   150   m=19   lp=2,0
320 167   163   m=20   lp=2,0
321 163   998   m=20   lp=2,0
333 998   157   m=20   lp=2,0
322 157   1     m=20   lp=2,0   nsl=0,0,5,8,0,0,10,12
323 153   168   m=8    lp=-2,0
324 168   163   m=8    lp=-2,0
325 159   168   m=8    lp=-2,0
326 168   157   m=8    lp=-2,0
327 159   169   m=8    lp=-2,0
328 169   167   m=8    lp=-2,0
329 165   169   m=8    lp=-2,0
330 169   163   m=8    lp=-2,0
351 100   170   m=24   lp=2,0
352 170   171   m=23   lp=2,0
353 49    172   m=26   lp=2,0
354 172   173   m=25   lp=2,0
355 174   175   m=26   lp=2,0   nsl=3,0,0,0,0,4,0,0 g=3,1,1,1
359 179   180   m=19   lp=2,0   nsl=2,1,0,0,0,0,0,0 g=3,1,1,1
363 183   184   m=25   lp=2,0
364 187   184   m=27   lp=3,0
365 184   173   m=27   lp=3,0
366 173   171   m=27   lp=3,0
367 186   183   m=19   lp=2,0   nsl=0,0,7,9,0,0,11,13
368 183   178   m=19   lp=2,0   nsl=0,0,7,9,0,0,11,13
369 178   172   m=19   lp=2,0
```

```
370 172  170  m=19  lp=2,0
371 185  179  m=20  lp=2,0
372 179  999  m=20  lp=2,0
384 999  174  m=20  lp=2,0
373 174  49   m=20  lp=2,0   nsl=0,0,7,9,0,0,11,13
374 174  188  m=8   lp=-2,0
375 188  183  m=8   lp=-2,0
376 179  188  m=8   lp=-2,0
377 188  178  m=8   lp=-2,0
378 179  189  m=8   lp=-2,0
379 189  186  m=8   lp=-2,0
380 185  189  m=8   lp=-2,0
381 189  183  m=8   lp=-2,0
C
C  Knee Braces
998 998 3  m=57 lp=2,0
999 999 47 m=57 lp=2,0

loads
51 99 48 l=1 f=0,0,-.376
52 54  1 l=1 f=0,0,-.737
55       l=1 f=0,0,-.832
56 58 1  l=1 f=0,0,-.737
59       l=1   f=0,0,-.832
60 62 1  l=1 f=0,0,-.737
63       l=1 f=0,0,-.952
64 66 1  l=1 f=0,0,-.737
67       l=1 f=0,0,-.832
68 70 1  l=1 f=0,0,-.737
71       l=1 f=0,0,-.832
72 74 1  l=1 f=0,0,-.737
75       l=1 f=0,0,-1.46
76 78 1  l=1 f=0,0,-.737
79       l=1 f=0,0,-.832
80 82 1  l=1 f=0,0,-.737
83       l=1 f=0,0,-.832
84 86 1  l=1 f=0,0,-.737
87       l=1 f=0,0,-.952
88 90 1  l=1 f=0,0,-.737
91       l=1 f=0,0,-.832
92 94 1  l=1 f=0,0,-.737
95       l=1 f=0,0,-.832
96 98 1  l=1 f=0,0,-.737
51 99 48 l=1 f=0,0,-.3
52 98 1  l=1 f=0,0,-.6
51  99 48 l=1 f=0,0,-.347
55 59 4   l=1 f=0,0,-.557
63 87 24  l=1 f=0,0,-.322
67 71 4   l=1 f=0,0,-.557
75        l=1 f=0,0,-.163
79 83 4   l=1 f=0,0,-.557
91 95 4   l=1 f=0,0,-.557
9 17 8    l=1 f=0,0,-.1775
33 41 8   l=1 f=0,0,-.1775
51 99 48  l=6 f=0,0,-.667
52 98 1   l=6 f=0,0,-1.333
1 49 48   l=2 f=0,0,-.533
```

```
3 23 2      l=2 f=0,0,-1.066
27 47 2     l=2 f=0,0,-1.066
158         l=3 f=10.83,0,0
149 151 2 l=3 f=.64,0,0
184         l=3 f=.746,0,0
171 173 2 l=3 f=.042,0,0
158         l=4 f=2.62,0,0
149 151 2 l=4 f=.145,0,0
184         l=4 f=13.5,0,0
171 173 2 l=4 f=.75,0,0
51          l=3 f=0,0,.867
52 57 1     l=3 f=0,0,1.73
58          l=3 f=0,0,.833
59 64 1     l=3 f=0,0,.533
65 98 1     l=3 f=0,0,-.2
99          l=3 f=0,0,-.1
51          l=4 f=0,0,3.13
52 57 1     l=4 f=0,0,6.27
58          l=4 f=0,0,5.37
59 64 1     l=4 f=0,0,5.07
65 98 1     l=4 f=0,0,4.33
99          l=4 f=0,0,2.17
3 23 2      l=5 f=0,0,-.5
27 47 2     l=5 f=0,0,-.5
158         l=7 f=-3.37,0,0
149 151 2 l=7 f=-.18,0,0
184         l=7 f=-3.37,0,0
171 173 2 l=7 f=-.18,0,0
51          l=7 f=0,0,.967
52 57 1     l=7 f=0,0,1.933
58          l=7 f=0,0,1.933
59 64 1     l=7 f=0,0,1.933
65 98 1     l=7 f=0,0,1.933
99          l=7 f=0,0,.967
51          l=8 f=0,0,3.2
52 57 1     l=8 f=0,0,6.4
58          l=8 f=0,0,6.4
59 64 1     l=8 f=0,0,6.4
65 98 1     l=8 f=0,0,6.4
99          l=8 f=0,0,3.2
```

Truss T2 Hangars 43 and 47 with Knee Braces

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,6 ID=1 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,1,0,1,0,0,0
2 c=1,0,0,1,1,0,0,0
3 c=1,0,0,0,1,0,1,0
4 c=1,0,0,0,1,0,0,1

sections
57 mn=s sh=t e=29000 fy=36 t=8,12,.5,1          :2L8x6x1/2
58 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5         :2L3x2.5x1/4
59 mn=s sh=g e=29000 fy=36 a=5.74 i=16.0,28.0 \
 as=2.97,2.97 z=9.03,8.04    t=9.23,10.8        :2L6x3.5x5/16-odd
60 mn=s sh=g e=29000 fy=36 a=7.22 i=20.2,32.75 \
 as=3.75,3.75 z=11.34,10.25 t=9.13,11           :2L6x4x3/8-odd
61 mn=s sh=t e=29000 fy=36 t=3,4,.25,.5         :2L3x2x1/4
62 mn=s sh=w14x90 e=29000
63 mn=s sh=w14x90 e=29000
64 mn=s sh=t e=29000 fy=36 t=4,6,.3125,.625     :2L4x3x5/16
65 mn=s sh=t e=29000 fy=36 t=5,6,.25,.5         :2L5x3x1/4
66 mn=s sh=w14x90 e=29000
67 mn=s sh=t e=29000 fy=36 t=6,12,.5,1          :2L6x6x1/2
68 mn=s sh=t e=29000 fy=36 t=3.5,5,.3125,.625 :2L3.5x2.5x5/16
69 mn=s sh=t e=29000 fy=36 t=3,5,.25,.5         :2L3x2.5x1/4
70 mn=s sh=t e=29000 fy=36 t=3,4,.3125,.625     :2L3x2x5/16
71 mn=s sh=g e=29000 fy=36 a=5.74 i=21.8,10.93 \
 as=3.8,2.2 z=9.7,5.5 t=7.98,7.375              :2L6x3.5x5/16
72 mn=s sh=g e=29000 fy=36 a=15.5  i=97.3,92.4 \
 as=8,8 z=30.1,36.9 t=11.65,16.37               :2L8x8x1/2
73 mn=s sh=g e=29000 fy=36 a=16.29 i=147,277    \
  as=6.7,2.4 z=55.6,28.3 t=16.7,12.35           :2C-12x40,10x15.3
74 mn=s sh=t e=29000 fy=36 t=6,7,.375,.75       :2L6x3.5x3/8

frame
223 226 1 m=74
1  48 1 m=57
62 63 1 m=67
77 78 1 m=60 l=1,.5
79      m=71 l=1,.5
80 84 1 m=59 l=1,.5
85 87 1 m=60 l=1,.5
89 91 1 m=60 l=1,.5
92 96 1 m=59 l=1,.5
97      m=71 l=1,.5
98 99 1 m=60 l=1,.5
101 124 1 m=58
126 149 1 m=61
201 202 1 m=60
203 204 1 m=71
205 206 1 m=65
211 212 1 m=64
213 214 1 m=70
```

```
215 216 1 m=69
217 218 1 m=68
219 220 1 m=64
221 222 1 m=71
227 228 1 m=71
229 230 1 m=64
231 232 1 m=68
233 234 1 m=69
235 236 1 m=70
237 238 1 m=64
243 244 1 m=65
245 246 1 m=71
247 248 1 m=60
374 381 1 m=68
323 330 1 m=68
317 318 1 l=1,.001
320        l=1,.001
305 312 1 l=1,.001
385        l=.5,.5
371        l=1,.001
367 368 1 l=1,.001
355 362 1 l=1,.001

998 999 1 m=72
```

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 24
SAP90_FILE:t2-47k/SAPSTL_FILE:asd.STL

Truss T2 Hangars 43 and 47 with Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS = RATIO	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
203	G									NON-COM
		(C)	.538	.441	.098	.000	114.32	4	(H1-1)	
204	G									NON-COM
		(C)	.528	.430	.097	.000	.00	4	(H1-1)	
205	T									NON-COM
		(C)	.688	.582	.106	.000	115.52	4	(H1-1)	
206	T									NON-COM
		(C)	.665	.561	.104	.000	.00	4	(H1-1)	
213	T									NON-COM
		(C)	.923	.792	.130	.000	.00	4	(H1-1)	
214	T									NON-COM
		(C)	1.036	.887	.149	.000	121.67	4	(H1-1)	
215	T		fa > Fe							NON-COM
216	T		fa > Fe							NON-COM
217	T									NON-COM
		(C)	1.333	1.004	.329	.000	.00	4	(H1-1)	
218	T									NON-COM
		(C)	1.364	1.019	.346	.000	124.20	4	(H1-1)	
219	T									NON-COM
		(C)	1.054	.824	.230	.000	.00	4	(H1-1)	
220	T									NON-COM
		(C)	1.068	.833	.235	.000	125.48	4	(H1-1)	
221	G									NON-COM
		(C)	.730	.616	.115	.000	.00	4	(H1-1)	
222	G									NON-COM
		(C)	.739	.624	.115	.000	126.77	4	(H1-1)	
223	T									NON-COM
		(C)	.778	.664	.114	.000	.00	4	(H1-1)	
224	T									NON-COM
		(C)	.797	.682	.115	.000	128.06	4	(H1-1)	
225	T									NON-COM
		(C)	.797	.682	.115	.000	128.06	4	(H1-1)	
226	T									NON-COM
		(C)	.778	.664	.114	.000	.00	4	(H1-1)	
227	G									NON-COM
		(C)	.739	.624	.115	.000	126.77	4	(H1-1)	
228	G									NON-COM
		(C)	.730	.616	.115	.000	.00	4	(H1-1)	
229	T									NON-COM
		(C)	1.068	.833	.235	.000	125.48	4	(H1-1)	
230	T									NON-COM
		(C)	1.054	.824	.230	.000	.00	4	(H1-1)	
231	T									NON-COM
		(C)	1.364	1.019	.346	.000	124.20	4	(H1-1)	
232	T									NON-COM
		(C)	1.333	1.004	.329	.000	.00	4	(H1-1)	
233	T		fa > Fe							NON-COM
234	T		fa > Fe							NON-COM
235	T									NON-COM
		(C)	1.036	.887	.149	.000	121.67	4	(H1-1)	

Truss T2 Hangars 43 and 47 with Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
236	T	(C)	.923	.792	.130	.000	.00	4	(H1-1)	NON-COM
243	T	(C)	.665	.561	.104	.000	.00	4	(H1-1)	NON-COM
244	T	(C)	.688	.582	.106	.000	115.52	4	(H1-1)	NON-COM
245	G	(C)	.528	.430	.097	.000	.00	4	(H1-1)	NON-COM
246	G	(C)	.538	.441	.098	.000	114.32	4	(H1-1)	NON-COM
				l/r > 300						
302	W12X22	(C)	1.102	.802	.300	.000	.00	4	(H1-1)	COMPACT
				kl/r > 200						
304	W14X30	(C)	.540	.151	.388	.000	.00	4	(H1-1)	COMPACT
327	T	(C)	.809	.674	.135	.000	180.23	2	(H1-1)	NON-COM
328	T	(C)	.885	.696	.189	.000	180.23	1	(H1-1)	NON-COM
329	T	(C)	.610	.472	.138	.000	.00	3	(H1-1)	NON-COM
330	T	(C)	.557	.448	.109	.000	.00	3	(H1-1)	NON-COM
				kl/r > 200						
351	W12X22	(C)	1.102	.802	.300	.000	312.00	4	(H1-1)	COMPACT
				kl/r > 200						
353	W14X30	(C)	.540	.151	.388	.000	312.00	4	(H1-1)	COMPACT
374	T	(C)	.619	.436	.183	.000	.00	1	(H1-1)	NON-COM
375	T	(C)	.552	.460	.092	.000	.00	1	(H1-1)	NON-COM
378	T	(C)	1.196	.923	.274	.000	180.23	1	(H1-1)	NON-COM
379	T	(C)	1.274	.947	.326	.000	180.23	1	(H1-1)	NON-COM

Truss T3 Hangars 44 and 45 Middle Knee Braces Average Wind

c **SAP90 INPUT**

```
system
L=8
C
C
C
joints
2    x=1920 z=-108 y=1440
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333  E=29000
2  sh=2l8x6x1/2-3         w=.0038333
3  sh=2l6x6x3/8-3         w=.00248333
4  sh=2l3x3.5x5/16-3      w=.0011
5  sh=2l3x3x1/4-3         w=.00081667
6  sh=2l6x3.5x5/16-3      w=.0016333
7  sh=2l3x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=2l3x2.5x1/4-3       w=.00075
10 sh=2l3x2x5/16-3        w=.0008333
11 sh=2l6x6x1/2-3         w=.0030667
12 sh=2l8x6x1/2-3         w=.0038333
```

```
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 a=14.7 j=200 i=597,288 as=9.29,9.9 e=29000 w=.005
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
9000 6470 6471 m=41 lp=1,0
9001 6480 6481 m=41 lp=1,0
```

```
7375 6482 6483 m=41 lp=1,0
7376 6470 6472 m=34 lp=2,0
7377 6472   25 m=34 lp=2,0
7378   25   75 m=34 lp=2,0
7379 6471 6473 m=35 lp=2,0
7380 6473  525 m=35 lp=2,0
7381  525  575 m=35 lp=2,0
7382 1025 1075 m=42 lp=2,0
7383 1525 1575 m=39 lp=2,0
7384 2025 2075 m=39 lp=2,0
7385 2525 2575 m=42 lp=2,0
7386 3025 3075 m=36 lp=2,0
7387 3525 3575 m=42 lp=2,0
7388 4025 4075 m=39 lp=2,0
7389 4525 4575 m=39 lp=2,0
7390 5025 5075 m=42 lp=2,0
7391 6480 6482 m=35 lp=2,0
7392 6482 5525 m=35 lp=2,0
7393 5525 5575 m=35 lp=2,0
7394 6481 6483 m=34 lp=2,0
7395 6483 6025 m=34 lp=2,0
7396 6025 6075 m=34 lp=2,0
7397 6478    2 m=36 lp=2,0
8       2 3025 m=36 lp=2,0
7398 6470 6474 m=37 lp=2,0
7399 6474 6473 m=37 lp=2,0
7400 6472 6475 m=37 lp=2,0
7401 6475  525 m=37 lp=2,0
7402   25 6476 m=37 lp=2,0
7403 6476  575 m=37 lp=2,0
7405 6472 6474 m=37 lp=2,0
7406 6474 6471 m=37 lp=2,0
7407   25 6475 m=37 lp=2,0
7408 6475 6473 m=37 lp=2,0
7409   75 6476 m=37 lp=2,0
7410 6476  525 m=37 lp=2,0
7411  575 1025 m=38 lp=2,0
7412 1075 1525 m=39 lp=2,0
7413 1525 6477 m=40 lp=2,0
7414 6477 2075 m=40 lp=2,0
7415 1575 6477 m=40 lp=2,0
7416 6477 2025 m=40 lp=2,0
7417 2025 2575 m=39 lp=2,0
7418 2525 3075 m=38 lp=2,0
7419 3075 3525 m=38 lp=2,0
7420 3575 4025 m=39 lp=2,0
7421 4025 6479 m=40 lp=2,0
7422 6479 4575 m=40 lp=2,0
7423 4075 6479 m=40 lp=2,0
7424 6479 4525 m=40 lp=2,0
7425 4525 5075 m=39 lp=2,0
7426 5025 5575 m=38 lp=2,0
7427 5525 6486 m=37 lp=2,0
7428 6486 6075 m=37 lp=2,0
7429 5575 6486 m=37 lp=2,0
7430 6486 6025 m=37 lp=2,0
7431 6482 6485 m=37 lp=2,0
```

```
7432 6485 6025 m=37 lp=2,0
7433 5525 6485 m=37 lp=2,0
7434 6485 6483 m=37 lp=2,0
7435 6480 6484 m=37 lp=2,0
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0
C
C Knee Braces
2    2    2525 m=57 lp=3,0
3    2    3525 m=57 lp=3,0

loads
C Dead Loads
25   6025 500  l=1 f=0,0,-27.35
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-1.43
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live Load
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,-3.7
575  5575 500  l=4 f=0,0,-7.4
C Wind II
75   6075 6000 l=5 f=0,0,105
575  5575 500  l=5 f=0,0,210
C Wind III
75             l=6 f=0,0,8.1
575  5575 500  l=6 f=0,0,16.2
6075           l=6 f=0,0,8.1
25             l=6 f=0,148.5,0
25   75   50   l=6 f=0,73.2,0
6025           l=6 f=0,20.5,0
6025 6075 50   l=6 f=0,10.1,0
C Wind IV
75             l=7 f=0,0,71.1
575  5575 500  l=7 f=0,0,142.2
6075           l=7 f=0,0,71.1
25             l=7 f=0,-25.6,0
25   75   50   l=7 f=0,-12.7,0
6025           l=7 f=0,220,0
6025 6075 50   l=7 f=0,109,0
C  P loads
25   6025 500  l=8 f=0,0,-6
```

Truss T3 Hangars 44 and 45 Middle Knee Braces
Average Wind

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14                   :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                       :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                      :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14                 :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62                :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                      :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154  \
   as=15.8,16 z=169,52.5 t=10.13,14                   :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
2       3 1 m=63
```

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 16
SAP90_FILE:t3-44km/SAPSTL_FILE:asd.STL

Truss T3 Hangars 44 and 45 Middle Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
2	G									NON-COM
		(C)	1.059	.995	.064	.000	.00	1	(H1-1)	
		(T)	.919	.875	.045	.000	.00	2	(H2-1)	
3	G									NON-COM
		(C)	1.059	.995	.064	.000	.00	1	(H1-1)	
		(T)	.919	.875	.045	.000	.00	2	(H2-1)	
7363	W14X74									COMPACT
		(C)	.552	.310	.000	.242	.00	1	(H1-1)	
		(T)	.515	.411	.000	.104	240.00	4	(H2-1)	
7364	W14X74									COMPACT
		(C)	.541	.375	.000	.166	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	.786	.467	.000	.319	.00	2	(H1-1)	
7370	G									NON-COM
		(C)	.786	.467	.000	.319	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.541	.375	.000	.166	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	.848	.527	.000	.320	240.00	3	(H1-1)	
7373	G									NON-COM
		(T)	.560	.440	.000	.120	240.00	4	(H2-1)	
7379	W14X145									COMPACT
		(C)	.896	.736	.000	.160	.00	3	(H1-1)	
7380	W14X145									COMPACT
		(C)	.594	.509	.000	.085	192.00	1	(H1-1)	
7382	W14X61									COMPACT
		(C)	.520	.381	.000	.139	200.00	1	(H1-1)	
		(T)	.825	.622	.000	.203	200.00	2	(H2-1)	
7383	W14X43									COMPACT
		(T)	.507	.460	.000	.047	.00	2	(H2-1)	
7384	W14X43									NON-COM
		(C)	.576	.423	.000	.153	200.00	1	(H1-1)	
		(T)	.865	.666	.000	.199	.00	2	(H2-1)	
7385	W14X61									COMPACT
		(C)	.933	.657	.000	.276	200.00	1	(H1-1)	
		(T)	1.192	.916	.000	.276	200.00	2	(H2-1)	
7387	W14X61									COMPACT
		(C)	.933	.657	.000	.276	200.00	1	(H1-1)	
		(T)	1.192	.916	.000	.276	200.00	2	(H2-1)	
7388	W14X43									NON-COM
		(C)	.576	.423	.000	.153	200.00	1	(H1-1)	
		(T)	.865	.666	.000	.199	.00	2	(H2-1)	
7389	W14X43									COMPACT
		(T)	.507	.460	.000	.047	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.520	.381	.000	.139	200.00	1	(H1-1)	
		(T)	.825	.622	.000	.203	200.00	2	(H2-1)	
7391	W14X145									COMPACT
		(T)	.528	.466	.000	.062	.00	4	(H2-1)	

Truss T3 Hangars 44 and 45 Middle Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO =	AXL +	B33 +	B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7392	W14X145									COMPACT
		(C)	.594	.509	.000	.085	192.00	1	(H1-1)	
7394	W14X90									COMPACT
		(C)	.977	.752	.000	.225	.00	4	(H1-1)	
7397	W33X201									NON-COM
		(C)	.559	.559	.000	.000	276.00	1	(H1-1)	
		(T)	.593	.593	.000	.000	276.00	2	(H2-1)	
7405	G									NON-COM
		(C)	.613	.572	.000	.041	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	.655	.575	.000	.079	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	.740	.675	.000	.066	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	.781	.678	.000	.103	153.67	3	(H1-1)	
7411	W14X74			fa > Fe						COMPACT
7412	W14X43			fa > Fe						NON-COM
7415	G									NON-COM
		(C)	.568	.557	.000	.011	156.20	3	(H1-1)	
		(T)	.663	.646	.000	.017	.00	2	(H2-1)	
7416	G									NON-COM
		(C)	.573	.563	.000	.010	78.10	3	(H1-1)	
		(T)	.657	.643	.000	.014	156.20	2	(H2-1)	
7417	W14X43			fa > Fe						NON-COM
7418	W14X74			fa > Fe						COMPACT
7419	W14X74			fa > Fe						COMPACT
7420	W14X43			fa > Fe						NON-COM
7421	G									NON-COM
		(C)	.555	.544	.000	.011	78.10	1	(H1-1)	
		(T)	.657	.643	.000	.014	.00	2	(H2-1)	
7422	G									NON-COM
		(C)	.552	.539	.000	.013	.00	1	(H1-1)	
		(T)	.663	.646	.000	.017	156.20	2	(H2-1)	
7425	W14X43			fa > Fe						NON-COM
7426	W14X74			fa > Fe						COMPACT
7431	G									NON-COM
		(T)	.716	.654	.000	.062	153.67	4	(H2-1)	
7432	G									NON-COM
		(T)	.735	.657	.000	.078	.00	4	(H2-1)	
7433	G									NON-COM
		(C)	.642	.590	.000	.052	153.67	4	(H1-1)	
7434	G									NON-COM
		(C)	.661	.594	.000	.066	153.67	4	(H1-1)	
7435	G									NON-COM
		(T)	.586	.536	.000	.050	153.67	4	(H2-1)	
7436	G									NON-COM
		(T)	.587	.539	.000	.049	153.67	4	(H2-1)	
7437	G									NON-COM
		(C)	.802	.752	.000	.050	76.84	4	(H1-1)	

Truss T3 Hangars 44 and 45 Middle Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7438	G									NON-COM
		(C)	.814	.756	.000	.058	153.67	4	(H1-1)	

Truss T3 Hangars 44 and 45 Middle Knee Braces
Stepped Wind Loading

c SAP90 INPUT

```
system
L=8
C
C
C
joints
2    x=1920 z=-108 y=1440
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333   E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
```

```
13 sh=214x3x5/16-3        w=.0012
14 sh=216x4x3/8-3         w=.00205
15 sh=215x3x1/4-3         w=.0011
16 sh=215x3.5x5/16-3      w=.00145
17 sh=w18x65              w=.00541667
18 sh=w24x68              w=.005667
19 sh=w18x46              w=.0038333
20 sh=w18x65              w=.00541667
21 sh=216x6x5/8-3         w=.0040333
22 sh=213x2.5x1/4-3       w=.00075
23 sh=w8x18               w=.0015
24 sh=w12x22              w=.0018333
25 sh=w10x22              w=.0018333
26 sh=w14x30              w=.0025
27 sh=w8x31               w=.00258333
28 sh=w12x26              w=.0021667
29 sh=w10x12              w=.001
30 sh=w10x22              w=.0018333
31 sh=14x3x1/4            w=.00048333
32 sh=13.5x2.5x1/4        w=.000408333
33 sh=215x3.5x3/8-3       w=.0017333
34 sh=w14x90              w=.0075
35 sh=w14x145             w=.01208333
36 sh=w33x201             w=.01675
37 sh=217x4x1/2           w=.00298
38 sh=w14x74              w=.0061667
39 sh=w14x43              w=.00358333
40 sh=215x3x5/16          w=.0013667
41 sh=s12x50              w=.0041667
42 sh=w14x61              w=.00508333
43 sh=w6x16               w=.001333
44 sh=213x2.5x1/4-3       w=.00075
45 sh=mc12x31             w=.00258333
46 sh=mc12x31             w=.00258333
47 sh=mc12x31             w=.00258333
48 sh=216x3.5x3/8-3       w=.00195
49 sh=215x3x5/16-3        w=.0013667
50 sh=215x5x3/8           w=.00205
51 sh=13x2.5x1/4          w=.000375
52 sh=13x2x1/4            w=.000341667
53 sh=w14x30              w=.0025
54 sh=215x3.5x5/16-3      w=.00145
55 sh=w14x34              w=.0028333
56 sh=14x3x5/16           w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75   575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25   525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
7375 6482 6483 m=41 lp=1,0
7376 6470 6472 m=34 lp=2,0
```

7377	6472	25	m=34	lp=2,0
7378	25	75	m=34	lp=2,0
7379	6471	6473	m=35	lp=2,0
7380	6473	525	m=35	lp=2,0
7381	525	575	m=35	lp=2,0
7382	1025	1075	m=42	lp=2,0
7383	1525	1575	m=39	lp=2,0
7384	2025	2075	m=39	lp=2,0
7385	2525	2575	m=42	lp=2,0
7386	3025	3075	m=36	lp=2,0
7387	3525	3575	m=42	lp=2,0
7388	4025	4075	m=39	lp=2,0
7389	4525	4575	m=39	lp=2,0
7390	5025	5075	m=42	lp=2,0
7391	6480	6482	m=35	lp=2,0
7392	6482	5525	m=35	lp=2,0
7393	5525	5575	m=35	lp=2,0
7394	6481	6483	m=34	lp=2,0
7395	6483	6025	m=34	lp=2,0
7396	6025	6075	m=34	lp=2,0
7397	6478	2	m=36	lp=2,0
8	2	3025	m=36	lp=2,0
7398	6470	6474	m=37	lp=2,0
7399	6474	6473	m=37	lp=2,0
7400	6472	6475	m=37	lp=2,0
7401	6475	525	m=37	lp=2,0
7402	25	6476	m=37	lp=2,0
7403	6476	575	m=37	lp=2,0
7405	6472	6474	m=37	lp=2,0
7406	6474	6471	m=37	lp=2,0
7407	25	6475	m=37	lp=2,0
7408	6475	6473	m=37	lp=2,0
7409	75	6476	m=37	lp=2,0
7410	6476	525	m=37	lp=2,0
7411	575	1025	m=38	lp=2,0
7412	1075	1525	m=39	lp=2,0
7413	1525	6477	m=40	lp=2,0
7414	6477	2075	m=40	lp=2,0
7415	1575	6477	m=40	lp=2,0
7416	6477	2025	m=40	lp=2,0
7417	2025	2575	m=39	lp=2,0
7418	2525	3075	m=38	lp=2,0
7419	3075	3525	m=38	lp=2,0
7420	3575	4025	m=39	lp=2,0
7421	4025	6479	m=40	lp=2,0
7422	6479	4575	m=40	lp=2,0
7423	4075	6479	m=40	lp=2,0
7424	6479	4525	m=40	lp=2,0
7425	4525	5075	m=39	lp=2,0
7426	5025	5575	m=38	lp=2,0
7427	5525	6486	m=37	lp=2,0
7428	6486	6075	m=37	lp=2,0
7429	5575	6486	m=37	lp=2,0
7430	6486	6025	m=37	lp=2,0
7431	6482	6485	m=37	lp=2,0
7432	6485	6025	m=37	lp=2,0
7433	5525	6485	m=37	lp=2,0

```
7434 6485 6483 m=37 lp=2,0
7435 6480 6484 m=37 lp=2,0
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0
C
C Knee Braces
2    2    2525 m=57 lp=2,0
3    2    3525 m=57 lp=2,0

loads
C Dead
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-1.43
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live Load
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,3.925
575  5575 500  l=4 f=0,0,7.85
C Wind II
75   6075 6000 l=5 f=0,0,108
575  5575 500  l=5 f=0,0,216
C Wind III
75             l=6 f=0,0,46.4
575            l=6 f=0,0,92.8
1075           l=6 f=0,0,59.2
1575           l=6 f=0,0,25.6
2075           l=6 f=0,0,8
2575 5575 500  l=6 f=0,0,-9.6
6075           l=6 f=0,0,-4.8
25             l=6 f=0,149,0
25   75   50   l=6 f=0,82,0
1575           l=6 f=0,103,0
4575           l=6 f=0,111,0
6025           l=6 f=0,41,0
6025 6075 50   l=6 f=0,10.5,0
C Wind IV
75             l=7 f=0,0,153.6
575            l=7 f=0,0,307.2
1075           l=7 f=0,0,275.2
1575           l=7 f=0,0,243.2
2075           l=7 f=0,0,225.6
2575 5575 500  l=7 f=0,0,208
```

```
6075            l=7 f=0,0,104
25              l=7 f=0,25.6,0
25    75   50   l=7 f=0,21.6,0
4575            l=7 f=0,18,0
6025            l=7 f=0,220,0
6025 6075 50    l=7 f=0,109,0
C  P loads
25    6025 500  l=8 f=0,0,-3
```

Truss T3 Hangars 44 and 45 Middle Knee Braces
Stepped Wind Loading

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14                :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                    :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                   :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14              :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62             :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                   :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154   \
   as=15.8,16 z=169,52.5 t=10.13,14                :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
2       3 1 m=63
```

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 16
SAP90_FILE:t3-44km/SAPSTL_FILE:asd.STL
T3-44 All Conditions .5 Minimum Middle Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
2	G									NON-COM
		(C)	1.358	.638	.000	.720	.00	3	(H1-1)	
		(T)	1.496	1.111	.000	.385	.00	2	(H2-1)	
3	G									NON-COM
		(C)	.677	.473	.000	.203	.00	1	(H1-1)	
		(T)	1.722	1.217	.000	.504	.00	4	(H2-1)	
8	W33X201									COMPACT
		(T)	.620	.507	.000	.113	.00	4	(H2-1)	
7351	W14X90									COMPACT
		(T)	.686	.462	.000	.224	.00	4	(H2-1)	
7352	G									NON-COM
		(T)	.690	.497	.000	.193	240.00	4	(H2-1)	
7353	G									NON-COM
		(T)	.577	.407	.000	.171	.00	4	(H2-1)	
7354	G									NON-COM
		(T)	.612	.377	.000	.235	.00	4	(H2-1)	
7357	G									NON-COM
		(T)	.588	.361	.000	.227	240.00	4	(H2-1)	
7358	G									NON-COM
		(T)	.554	.404	.000	.150	240.00	4	(H2-1)	
7359	G									NON-COM
		(T)	.639	.478	.000	.161	.00	4	(H2-1)	
7360	W14X90									COMPACT
		(T)	.716	.538	.000	.178	.00	4	(H2-1)	
7363	W14X74									COMPACT
		(T)	1.035	.706	.000	.330	.00	4	(H2-1)	
7364	W14X74									COMPACT
		(C)	.706	.482	.000	.225	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	1.061	.590	.000	.472	.00	2	(H1-1)	
7366	W14X74									COMPACT
		(T)	.626	.414	.000	.212	.00	4	(H2-1)	
7369	W14X74									COMPACT
		(T)	.635	.433	.000	.202	240.00	4	(H2-1)	
7370	G									NON-COM
		(C)	1.061	.590	.000	.472	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.706	.482	.000	.225	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	1.509	.810	.000	.700	240.00	3	(H1-1)	
		(T)	.571	.365	.000	.207	240.00	2	(H2-1)	
7373	G									NON-COM
		(T)	.520	.488	.000	.032	240.00	4	(H2-1)	
7376	W14X90									COMPACT
		(T)	.726	.680	.000	.046	192.00	3	(H2-1)	
7380	W14X145									COMPACT
		(T)	.809	.608	.000	.201	192.00	4	(H2-1)	
7381	W14X145									COMPACT
		(T)	.796	.684	.000	.112	200.00	4	(H2-1)	

T3-44 All Conditions .5 Minimum Middle Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7382	W14X61									COMPACT
		(T)	1.214	.891	.000	.322	.00	4	(H2-1)	
7383	W14X43									COMPACT
		(T)	.583	.515	.000	.068	.00	4	(H2-1)	
7384	W14X43									COMPACT
		(T)	1.018	.742	.000	.275	.00	4	(H2-1)	
7385	W14X61									COMPACT
		(C)	.601	.456	.000	.145	200.00	3	(H1-1)	
		(T)	1.458	1.089	.000	.368	200.00	4	(H2-1)	
7386	W33X201									COMPACT
		(T)	.530	.530	.000	.000	.00	2	(H2-1)	
7387	W14X61									COMPACT
		(C)	.510	.399	.000	.111	200.00	3	(H1-1)	
		(T)	1.444	1.078	.000	.366	200.00	4	(H2-1)	
7388	W14X43									COMPACT
		(T)	.985	.710	.000	.275	.00	4	(H2-1)	
7389	W14X43									COMPACT
		(T)	.505	.452	.000	.053	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.621	.445	.000	.176	200.00	3	(H1-1)	
		(T)	.935	.691	.000	.244	200.00	2	(H2-1)	
7391	W14X145									COMPACT
		(T)	.823	.803	.000	.020	192.00	4	(H2-1)	
7392	W14X145									COMPACT
		(T)	.631	.522	.000	.109	192.00	2	(H2-1)	
7393	W14X145									COMPACT
		(T)	.591	.509	.000	.082	200.00	2	(H2-1)	
7394	W14X90									COMPACT
		(C)	.723	.708	.000	.015	.00	3	(H1-1)	
7397	W33X201									NON-COM
		(C)	.524	.332	.000	.193	276.00	3	(H1-1)	
		(T)	.904	.766	.000	.139	276.00	4	(H2-1)	
7398	G									NON-COM
		(T)	.835	.780	.000	.055	153.67	3	(H2-1)	
7399	G									NON-COM
		(T)	.847	.783	.000	.064	153.67	3	(H2-1)	
7400	G									NON-COM
		(T)	.804	.736	.000	.067	153.67	4	(H2-1)	
7401	G									NON-COM
		(T)	.784	.739	.000	.045	.00	4	(H2-1)	
7405	G									NON-COM
		(C)	.994	.905	.000	.089	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	1.084	.909	.000	.175	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	1.048	.979	.000	.068	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	1.156	.983	.000	.173	153.67	3	(H1-1)	
7411	W14X74			fa > Fe						COMPACT
7412	W14X43			fa > Fe						NON-COM

T3-44 All Conditions .5 Minimum Middle Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7413	G									NON-COM
		(C)	.540	.516	.000	.024	.00	2	(H1-1)	
7414	G									NON-COM
		(C)	.557	.512	.000	.045	156.20	2	(H1-1)	
7415	G									NON-COM
		(T)	.938	.918	.000	.019	.00	4	(H2-1)	
7416	G									NON-COM
		(T)	.934	.916	.000	.019	156.20	4	(H2-1)	
7417	W14X43		fa > Fe							NON-COM
7418	W14X74		fa > Fe							COMPACT
7419	W14X74		fa > Fe							COMPACT
7420	W14X43		fa > Fe							NON-COM
7421	G									NON-COM
		(T)	1.001	.984	.000	.017	.00	4	(H2-1)	
7422	G									NON-COM
		(T)	1.002	.986	.000	.016	156.20	4	(H2-1)	
7423	G									NON-COM
		(C)	.746	.686	.000	.061	.00	4	(H1-1)	
7424	G									NON-COM
		(C)	.725	.690	.000	.035	156.20	4	(H1-1)	
7425	W14X43		fa > Fe							NON-COM
7426	W14X74		fa > Fe							COMPACT
7431	G									NON-COM
		(T)	.815	.738	.000	.077	153.67	4	(H2-1)	
7432	G									NON-COM
		(T)	.822	.741	.000	.081	.00	4	(H2-1)	
7433	G									NON-COM
		(C)	.957	.880	.000	.077	.00	3	(H1-1)	
7434	G									NON-COM
		(C)	1.041	.883	.000	.158	153.67	3	(H1-1)	
7435	G									NON-COM
		(T)	.679	.610	.000	.069	153.67	4	(H2-1)	
7436	G									NON-COM
		(T)	.679	.612	.000	.067	153.67	4	(H2-1)	
7437	G									NON-COM
		(C)	.952	.860	.000	.092	38.42	3	(H1-1)	
7438	G									NON-COM
		(C)	1.035	.864	.000	.170	153.67	3	(H1-1)	

Truss T3 Hangars 43 and 47 Middle Knee Braces   Average Wind

c **SAP90 INPUT**

```
system
L=8
C
C
C
joints
2    x=1920 z=-108 y=1440
25   x=1920 z=0    y=0
6025        z=0    y=2880  g=25,6025,500
75   x=1920 z=200  y=0
6075 x=1920 z=200  y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333  E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
12 sh=218x6x1/2-3         w=.0038333
```

```
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 a=14.7 j=200 i=597,288 as=9.29,9.9 e=29000 w=.005
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
9000 6470 6471 m=30 lp=1,0
9001 6480 6481 m=30 lp=1,0
```

7375	6482	6483	m=41	lp=1,0
7376	6470	6472	m=34	lp=2,0
7377	6472	25	m=34	lp=2,0
7378	25	75	m=34	lp=2,0
7379	6471	6473	m=35	lp=2,0
7380	6473	525	m=35	lp=2,0
7381	525	575	m=35	lp=2,0
7382	1025	1075	m=42	lp=2,0
7383	1525	1575	m=39	lp=2,0
7384	2025	2075	m=39	lp=2,0
7385	2525	2575	m=42	lp=2,0
7386	3025	3075	m=36	lp=2,0
7387	3525	3575	m=42	lp=2,0
7388	4025	4075	m=39	lp=2,0
7389	4525	4575	m=39	lp=2,0
7390	5025	5075	m=42	lp=2,0
7391	6480	6482	m=35	lp=2,0
7392	6482	5525	m=35	lp=2,0
7393	5525	5575	m=35	lp=2,0
7394	6481	6483	m=34	lp=2,0
7395	6483	6025	m=34	lp=2,0
7396	6025	6075	m=34	lp=2,0
7397	6478	2	m=36	lp=2,0
8	2	3025	m=36	lp=2,0
7398	6470	6474	m=37	lp=2,0
7399	6474	6473	m=37	lp=2,0
7400	6472	6475	m=37	lp=2,0
7401	6475	525	m=37	lp=2,0
7402	25	6476	m=37	lp=2,0
7403	6476	575	m=37	lp=2,0
7405	6472	6474	m=37	lp=2,0
7406	6474	6471	m=37	lp=2,0
7407	25	6475	m=37	lp=2,0
7408	6475	6473	m=37	lp=2,0
7409	75	6476	m=37	lp=2,0
7410	6476	525	m=37	lp=2,0
7411	575	1025	m=38	lp=2,0
7412	1075	1525	m=39	lp=2,0
7413	1525	6477	m=40	lp=2,0
7414	6477	2075	m=40	lp=2,0
7415	1575	6477	m=40	lp=2,0
7416	6477	2025	m=40	lp=2,0
7417	2025	2575	m=39	lp=2,0
7418	2525	3075	m=38	lp=2,0
7419	3075	3525	m=38	lp=2,0
7420	3575	4025	m=39	lp=2,0
7421	4025	6479	m=40	lp=2,0
7422	6479	4575	m=40	lp=2,0
7423	4075	6479	m=40	lp=2,0
7424	6479	4525	m=40	lp=2,0
7425	4525	5075	m=39	lp=2,0
7426	5025	5575	m=38	lp=2,0
7427	5525	6486	m=37	lp=2,0
7428	6486	6075	m=37	lp=2,0
7429	5575	6486	m=37	lp=2,0
7430	6486	6025	m=37	lp=2,0
7431	6482	6485	m=37	lp=2,0

```
7432 6485 6025 m=37 lp=2,0
7433 5525 6485 m=37 lp=2,0
7434 6485 6483 m=37 lp=2,0
7435 6480 6484 m=37 lp=2,0
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0
C
C Knee Braces
2    2    2525 m=57 lp=3,0
3    2    3525 m=57 lp=3,0

loads
C Dead
25   6025 500  l=1 f=0,0,-27.35
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-4.6
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,-3.7
575  5575 500  l=4 f=0,0,-7.4
C Wind II
75   6075 6000 l=5 f=0,0,105
575  5575 500  l=5 f=0,0,210
C Wind III
75             l=6 f=0,0,8.1
575  5575 500  l=6 f=0,0,16.2
6075           l=6 f=0,0,8.1
25             l=6 f=0,148.5,0
25   75   50   l=6 f=0,73.2,0
1575           l=6 f=0,110.6,0
4575           l=6 f=0,110.6,0
6025           l=6 f=0,20.5,0
6025 6075 50   l=6 f=0,10.1,0
C Wind IV
75             l=7 f=0,0,71.1
575  5575 500  l=7 f=0,0,142.2
6075           l=7 f=0,0,71.1
25             l=7 f=0,-25.6,0
25   75   50   l=7 f=0,-12.7,0
1575 4575 3000 l=7 f=0,-18,0
6025           l=7 f=0,220,0
```

```
6025 6075 50    l=7 f=0,109,0
C  P loads
25   6025 500   l=8 f=0,0,-6
```

Truss T3 Hangars 43 and 47 Middle Knee Braces
Average Wind

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14                 :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                     :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                    :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14               :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62              :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                    :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154  \
   as=15.8,16 z=169,52.5 t=10.13,14                 :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
2       3 1 m=63
```

Truss T3 Hangars 43 and 47 Middle Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
2	G									NON-COM
		(C)	1.099	1.031	.069	.000	.00	1	(H1-1)	
		(T)	.897	.854	.043	.000	.00	2	(H2-1)	
3	G									NON-COM
		(C)	1.099	1.031	.069	.000	.00	1	(H1-1)	
		(T)	.897	.854	.043	.000	.00	2	(H2-1)	
8	W33X201									NON-COM
		(C)	.500	.298	.000	.202	.00	3	(H1-1)	
7363	W14X74									COMPACT
		(C)	.572	.321	.000	.251	.00	1	(H1-1)	
7364	W14X74									COMPACT
		(C)	.527	.366	.000	.162	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	.766	.457	.000	.309	.00	2	(H1-1)	
7369	W14X74									COMPACT
		(C)	.567	.391	.000	.176	.00	3	(H1-1)	
7370	G									NON-COM
		(C)	.766	.457	.000	.309	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.527	.366	.000	.162	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	1.599	.844	.000	.755	240.00	3	(H1-1)	
7373	G									NON-COM
		(T)	.568	.453	.000	.115	240.00	4	(H2-1)	
7376	W14X90									COMPACT
		(T)	.583	.571	.000	.012	.00	3	(H2-1)	
7379	W14X145									COMPACT
		(C)	1.108	.996	.000	.112	.00	3	(H1-1)	
7380	W14X145									COMPACT
		(C)	.755	.570	.000	.185	192.00	3	(H1-1)	
7382	W14X61									COMPACT
		(C)	.533	.388	.000	.145	200.00	1	(H1-1)	
		(T)	.816	.617	.000	.199	200.00	2	(H2-1)	
7383	W14X43									COMPACT
		(T)	.509	.463	.000	.046	.00	2	(H2-1)	
7384	W14X43									NON-COM
		(C)	.587	.427	.000	.160	200.00	1	(H1-1)	
		(T)	.858	.664	.000	.195	.00	2	(H2-1)	
7385	W14X61									COMPACT
		(C)	.967	.674	.000	.293	200.00	1	(H1-1)	
		(T)	1.174	.904	.000	.270	200.00	2	(H2-1)	
7387	W14X61									COMPACT
		(C)	.967	.674	.000	.293	200.00	1	(H1-1)	
		(T)	1.174	.904	.000	.270	200.00	2	(H2-1)	
7388	W14X43									NON-COM
		(C)	.587	.427	.000	.160	200.00	1	(H1-1)	
		(T)	.858	.664	.000	.195	.00	2	(H2-1)	
7389	W14X43									COMPACT
		(T)	.509	.463	.000	.046	.00	2	(H2-1)	

Truss T3 Hangars 43 and 47 Middle Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7390	W14X61									COMPACT
		(C)	.533	.388	.000	.145	200.00	1	(H1-1)	
		(T)	.816	.617	.000	.199	200.00	2	(H2-1)	
7392	W14X145									COMPACT
		(C)	.617	.526	.000	.091	192.00	1	(H1-1)	
7394	W14X90									COMPACT
		(C)	1.007	.888	.000	.119	192.00	3	(H1-1)	
7395	W14X90									COMPACT
		(C)	.521	.375	.000	.146	192.00	3	(H1-1)	
7397	W33X201									NON-COM
		(C)	.683	.433	.000	.250	276.00	3	(H1-1)	
		(T)	.579	.579	.000	.000	276.00	2	(H2-1)	
7398	G									NON-COM
		(T)	.753	.690	.000	.063	153.67	3	(H2-1)	
7399	G									NON-COM
		(T)	.759	.693	.000	.067	.00	3	(H2-1)	
7400	G									NON-COM
		(T)	.644	.615	.000	.030	153.67	3	(H2-1)	
7401	G									NON-COM
		(T)	.648	.617	.000	.031	153.67	3	(H2-1)	
7405	G									NON-COM
		(C)	.955	.887	.000	.068	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	1.091	.891	.000	.200	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	1.034	.962	.000	.072	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	1.117	.965	.000	.151	153.67	3	(H1-1)	
7411	W14X74			fa > Fe						COMPACT
7412	W14X43			fa > Fe						NON-COM
7415	G									NON-COM
		(C)	.770	.752	.000	.018	.00	3	(H1-1)	
		(T)	.652	.636	.000	.017	.00	2	(H2-1)	
7416	G									NON-COM
		(C)	.774	.757	.000	.016	78.10	3	(H1-1)	
		(T)	.646	.633	.000	.014	156.20	2	(H2-1)	
7417	W14X43			fa > Fe						NON-COM
7418	W14X74			fa > Fe						COMPACT
7419	W14X74			fa > Fe						COMPACT
7420	W14X43			fa > Fe						NON-COM
7421	G									NON-COM
		(C)	.572	.561	.000	.011	78.10	1	(H1-1)	
		(T)	.646	.633	.000	.014	.00	2	(H2-1)	
7422	G									NON-COM
		(C)	.569	.555	.000	.014	.00	1	(H1-1)	
		(T)	.652	.636	.000	.017	156.20	2	(H2-1)	
7425	W14X43			fa > Fe						NON-COM
7426	W14X74			fa > Fe						COMPACT
7431	G									NON-COM
		(T)	.678	.618	.000	.060	153.67	4	(H2-1)	

Truss T3 Hangars 43 and 47 Middle Knee Braces Avg. Wind

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7432	G	(T)	.696	.621	.000	.075	.00	4	(H2-1)	NON-COM
7433	G	(C)	.941	.859	.000	.082	.00	3	(H1-1)	NON-COM
7434	G	(C)	.976	.862	.000	.113	153.67	3	(H1-1)	NON-COM
7435	G	(T)	.560	.524	.000	.036	153.67	3	(H2-1)	NON-COM
7436	G	(T)	.601	.527	.000	.075	.00	3	(H2-1)	NON-COM
7437	G	(C)	.900	.829	.000	.070	38.42	3	(H1-1)	NON-COM
7438	G	(C)	1.010	.834	.000	.177	153.67	3	(H1-1)	NON-COM

Truss T3 Hangars 43 and 47 Middle Knee Braces
Stepped Wind Loading

c **SAP90 INPUT**

```
system
L=8
C
C
C
joints
2     x=1920 z=-108 y=1440
25    x=1920 z=0    y=0
6025         z=0    y=2880  g=25,6025,500
75    x=1920 z=200  y=0
6075 x=1920 z=200   y=2880  g=75,6075,500
6470 x=1920 z=-384 y=0
6471 x=1920 z=-384 y=240
6472 x=1920 z=-192 y=0
6473 x=1920 z=-192 y=240
6474 x=1920 z=-288 y=120
6475 x=1920 z=-96  y=120
6476 x=1920 z=100  y=120
6477 x=1920 z=100  y=840
6478 x=1920 z=-384 y=1440
6479 x=1920 z=100  y=2040
6480 x=1920 z=-384 y=2640
6481 x=1920 z=-384 y=2880
6482 x=1920 z=-192 y=2640
6483 x=1920 z=-192 y=2880
6484 x=1920 z=-288 y=2760
6485 x=1920 z=-96  y=2760
6486 x=1920 z=100  y=2760

restraints
6470 r=1,1,1,0,0,0
6471 r=1,1,1,0,0,0
6478 r=1,1,1,0,0,0
6480 r=1,1,1,0,0,0
6481 r=1,1,1,0,0,0
75 6075 500 r=1,0,0,0,0,0
25 6025 500 r=1,0,0,0,0,0

frame
nm=57 nl=0 z=-1,0,0,0,0,0,0,0
1  sh=w18x76              w=.006333  E=29000
2  sh=218x6x1/2-3         w=.0038333
3  sh=216x6x3/8-3         w=.00248333
4  sh=213x3.5x5/16-3      w=.0011
5  sh=213x3x1/4-3         w=.00081667
6  sh=216x3.5x5/16-3      w=.0016333
7  sh=213x3x5/16-3        w=.00101667
8  sh=2L3.5X2.5X5/16-3    w=.001008333
9  sh=213x2.5x1/4-3       w=.00075
10 sh=213x2x5/16-3        w=.0008333
11 sh=216x6x1/2-3         w=.0030667
```

```
12 sh=218x6x1/2-3        w=.0038333
13 sh=214x3x5/16-3       w=.0012
14 sh=216x4x3/8-3        w=.00205
15 sh=215x3x1/4-3        w=.0011
16 sh=215x3.5x5/16-3     w=.00145
17 sh=w18x65             w=.00541667
18 sh=w24x68             w=.005667
19 sh=w18x46             w=.0038333
20 sh=w18x65             w=.00541667
21 sh=216x6x5/8-3        w=.0040333
22 sh=213x2.5x1/4-3      w=.00075
23 sh=w8x18              w=.0015
24 sh=w12x22             w=.0018333
25 sh=w10x22             w=.0018333
26 sh=w14x30             w=.0025
27 sh=w8x31              w=.00258333
28 sh=w12x26             w=.0021667
29 sh=w10x12             w=.001
30 sh=w10x22             w=.0018333
31 sh=14x3x1/4           w=.00048333
32 sh=13.5x2.5x1/4       w=.000408333
33 sh=215x3.5x3/8-3      w=.0017333
34 sh=w14x90             w=.0075
35 sh=w14x145            w=.01208333
36 sh=w33x201            w=.01675
37 sh=217x4x1/2          w=.00298
38 sh=w14x74             w=.0061667
39 sh=w14x43             w=.00358333
40 sh=215x3x5/16         w=.0013667
41 sh=s12x50             w=.0041667
42 sh=w14x61             w=.00508333
43 sh=w6x16              w=.001333
44 sh=213x2.5x1/4-3      w=.00075
45 sh=mc12x31            w=.00258333
46 sh=mc12x31            w=.00258333
47 sh=mc12x31            w=.00258333
48 sh=216x3.5x3/8-3      w=.00195
49 sh=215x3x5/16-3       w=.0013667
50 sh=215x5x3/8          w=.00205
51 sh=13x2.5x1/4         w=.000375
52 sh=13x2x1/4           w=.000341667
53 sh=w14x30             w=.0025
54 sh=215x3.5x5/16-3     w=.00145
55 sh=w14x34             w=.0028333
56 sh=14x3x5/16          w=.0006
57 sh=218x8x1/2
C  T3 elements
7350   75  575 m=41 lp=1,0
7351  575 1075 m=34 lp=1,0
7352 1075 1575 m=34 lp=1,0  g=1,1,500,500
7354 2075 2575 m=34 lp=1,0  g=6,1,500,500
7361 5575 6075 m=41 lp=1,0
7362   25  525 m=41 lp=1,0
7363  525 1025 m=38 lp=1,0  g=9,1,500,500
7373 5525 6025 m=41 lp=1,0
7374 6472 6473 m=41 lp=1,0
7375 6482 6483 m=41 lp=1,0
```

```
7376 6470 6472 m=34 lp=2,0
7377 6472   25 m=34 lp=2,0
7378   25   75 m=34 lp=2,0
7379 6471 6473 m=35 lp=2,0
7380 6473  525 m=35 lp=2,0
7381  525  575 m=35 lp=2,0
7382 1025 1075 m=42 lp=2,0
7383 1525 1575 m=39 lp=2,0
7384 2025 2075 m=39 lp=2,0
7385 2525 2575 m=42 lp=2,0
7386 3025 3075 m=36 lp=2,0
7387 3525 3575 m=42 lp=2,0
7388 4025 4075 m=39 lp=2,0
7389 4525 4575 m=39 lp=2,0
7390 5025 5075 m=42 lp=2,0
7391 6480 6482 m=35 lp=2,0
7392 6482 5525 m=35 lp=2,0
7393 5525 5575 m=35 lp=2,0
7394 6481 6483 m=34 lp=2,0
7395 6483 6025 m=34 lp=2,0
7396 6025 6075 m=34 lp=2,0
7397 6478    2 m=36 lp=2,0
8       2 3025 m=36 lp=2,0
7398 6470 6474 m=37 lp=2,0
7399 6474 6473 m=37 lp=2,0
7400 6472 6475 m=37 lp=2,0
7401 6475  525 m=37 lp=2,0
7402   25 6476 m=37 lp=2,0
7403 6476  575 m=37 lp=2,0
7405 6472 6474 m=37 lp=2,0
7406 6474 6471 m=37 lp=2,0
7407   25 6475 m=37 lp=2,0
7408 6475 6473 m=37 lp=2,0
7409   75 6476 m=37 lp=2,0
7410 6476  525 m=37 lp=2,0
7411  575 1025 m=38 lp=2,0
7412 1075 1525 m=39 lp=2,0
7413 1525 6477 m=40 lp=2,0
7414 6477 2075 m=40 lp=2,0
7415 1575 6477 m=40 lp=2,0
7416 6477 2025 m=40 lp=2,0
7417 2025 2575 m=39 lp=2,0
7418 2525 3075 m=38 lp=2,0
7419 3075 3525 m=38 lp=2,0
7420 3575 4025 m=39 lp=2,0
7421 4025 6479 m=40 lp=2,0
7422 6479 4575 m=40 lp=2,0
7423 4075 6479 m=40 lp=2,0
7424 6479 4525 m=40 lp=2,0
7425 4525 5075 m=39 lp=2,0
7426 5025 5575 m=38 lp=2,0
7427 5525 6486 m=37 lp=2,0
7428 6486 6075 m=37 lp=2,0
7429 5575 6486 m=37 lp=2,0
7430 6486 6025 m=37 lp=2,0
7431 6482 6485 m=37 lp=2,0
7432 6485 6025 m=37 lp=2,0
```

```
7433 5525 6485 m=37 lp=2,0
7434 6485 6483 m=37 lp=2,0
7435 6480 6484 m=37 lp=2,0
7436 6484 6483 m=37 lp=2,0
7437 6482 6484 m=37 lp=2,0
7438 6484 6481 m=37 lp=2,0
C
C Knee Braces
2    2    2525 m=57 lp=2,0
3    2    3525 m=57 lp=2,0

loads
C Dead
75   6075 6000 l=1 f=0,0,-19
575  5575 500  l=1 f=0,0,-38
525  5525 500  l=1 f=0,0,-4.6
25             l=1 f=0,0,-2.8
525            l=1 f=0,0,-2.8
3025           l=1 f=0,0,-2.8
5525           l=1 f=0,0,-2.8
6025           l=1 f=0,0,-2.8
75   6075 6000 l=1 f=0,0,-.53
575  5577 500  l=1 f=0,0,-1.06
75             l=1 f=0,0,-15
6075           l=1 f=0,0,-15
C Live
75   6075 6000 l=2 f=0,0,-17.1
575  5575 500  l=2 f=0,0,-34.1
C Roof Live
75   6075 6000 l=3 f=0,0,-24.1
575  5575 500  l=3 f=0,0,-48.1
C Wind I
75   6075 6000 l=4 f=0,0,3.925
575  5575 500  l=4 f=0,0,7.85
C Wind II
75   6075 6000 l=5 f=0,0,108
575  5575 500  l=5 f=0,0,216
C Wind III
75             l=6 f=0,0,46.4
575            l=6 f=0,0,92.8
1075           l=6 f=0,0,59.2
1575           l=6 f=0,0,25.6
2075           l=6 f=0,0,8
2575 5575 500  l=6 f=0,0,-9.6
6075           l=6 f=0,0,-4.8
25             l=6 f=0,149,0
25   75   50   l=6 f=0,82,0
1575           l=6 f=0,103,0
4575           l=6 f=0,111,0
6025           l=6 f=0,41,0
6025 6075 50   l=6 f=0,10.5,0
C Wind IV
75             l=7 f=0,0,153.6
575            l=7 f=0,0,307.2
1075           l=7 f=0,0,275.2
1575           l=7 f=0,0,243.2
2075           l=7 f=0,0,225.6
```

```
2575 5575 500  l=7 f=0,0,208
6075           l=7 f=0,0,104
25             l=7 f=0,25.6,0
25   75   50   l=7 f=0,21.6,0
4575           l=7 f=0,18,0
6025           l=7 f=0,220,0
6025 6075 50   l=7 f=0,109,0
C  P loads
25   6025 500  l=8 f=0,0,-3
```

Truss T3 Hangars 43 and 47 Middle Knee Braces
Stepped Wind Loading

```
C
C SAPSTL INPUT
C
CONTROL
IX=0 IT=1 IL=2,3 ID=1,8 IU=E IP=0 R=.5,.5
COMBO
1 c=1,0,0,1,0,0,0,1
2 c=1,0,0,0,1,0,0,1
3 c=1,0,0,0,0,1,0,1
4 c=1,0,0,0,0,0,1,1

sections
58 mn=s sh=g e=29000 fy=36 a=12.96 i=488,64.8 \
   as=5,8.75 z=78.24,25.2 t=4.92,14                 :2L7x4x5/8
59 mn=s sh=g e=29000 fy=36 a=22.89 i=802,479 \
   as=8,10 z=65,112.2 t=9.16,14                     :2C12x30
60 mn=s sh=g e=29000 fy=36 a=14.7 i=597,288   \
   as=9.29,9.9 z=93,58.4 t=12,14                    :2C12x25
61 mn=s sh=g e=29000 fy=36 a=37.5 i=1110,367.5 \
   as=20.6,16 z=187.3,83.2 t=14.52,14               :14-H-87,2P
62 mn=s sh=g e=29000 fy=36 a=4.8 i=195.2,12.52 \
   as=3.1,1.9 z=30.33,6.72 t=6.38,1.62              :2L5x3x5/16
63 mn=s sh=g e=29000 fy=36 a=15.5 i=185,97.3   \
   as=8,8 z=36.9,30.1 t=8,16.375                    :2L8x8x1/2
64 mn=s sh=w14x82 e=29000 fy=36
65 mn=s sh=g e=29000 fy=36 a=35.1 i=993,154  \
   as=15.8,16 z=169,52.5 t=10.13,14                 :14-H-78,2P

frame
7398 7403 1 m=58
7405 7410 1 m=58
7427 7438 1 m=58
7350        m=59
7361        m=59
7362        m=60
7373 7375 1 m=60
7352 7354 1 m=61
7357 7359 1 m=61
7413 7416 1 m=62
7421 7424 1 m=62
7365        m=65
7370        m=65
2       3 1 m=63
```

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 16
SAP90_FILE:t3-47km/SAPSTL_FILE:asd.STL
T3-47 All Conditions .5 Minimum Middle Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
2	G									NON-COM
		(C)	1.476	.675	.000	.801	.00	3	(H1-1)	
		(T)	1.467	1.090	.000	.377	.00	2	(H2-1)	
3	G									NON-COM
		(C)	.739	.510	.000	.230	.00	1	(H1-1)	
		(T)	1.694	1.197	.000	.497	.00	4	(H2-1)	
8	W33X201									COMPACT
		(T)	.610	.497	.000	.113	.00	4	(H2-1)	
7351	W14X90									COMPACT
		(T)	.676	.455	.000	.221	.00	4	(H2-1)	
7352	G									NON-COM
		(T)	.681	.489	.000	.191	240.00	4	(H2-1)	
7353	G									NON-COM
		(T)	.569	.400	.000	.169	.00	4	(H2-1)	
7354	G									NON-COM
		(T)	.603	.371	.000	.232	.00	4	(H2-1)	
7357	G									NON-COM
		(T)	.580	.355	.000	.224	240.00	4	(H2-1)	
7358	G									NON-COM
		(T)	.546	.397	.000	.148	240.00	4	(H2-1)	
7359	G									NON-COM
		(T)	.630	.471	.000	.159	.00	4	(H2-1)	
7360	W14X90									COMPACT
		(T)	.707	.532	.000	.175	.00	4	(H2-1)	
7363	W14X74									COMPACT
		(T)	1.024	.699	.000	.325	.00	4	(H2-1)	
7364	W14X74									COMPACT
		(C)	.692	.473	.000	.219	240.00	2	(H1-1)	
7365	G									NON-COM
		(C)	1.035	.579	.000	.455	.00	2	(H1-1)	
7366	W14X74									COMPACT
		(T)	.618	.409	.000	.210	.00	4	(H2-1)	
7369	W14X74									COMPACT
		(T)	.628	.428	.000	.199	240.00	4	(H2-1)	
7370	G									NON-COM
		(C)	1.035	.579	.000	.455	240.00	2	(H1-1)	
7371	W14X74									COMPACT
		(C)	.692	.473	.000	.219	.00	2	(H1-1)	
7372	W14X74									COMPACT
		(C)	1.556	.821	.000	.735	240.00	3	(H1-1)	
		(T)	.560	.358	.000	.202	240.00	2	(H2-1)	
7373	G									NON-COM
		(T)	.517	.485	.000	.032	240.00	4	(H2-1)	
7376	W14X90									COMPACT
		(T)	.728	.681	.000	.047	192.00	3	(H2-1)	
7380	W14X145									COMPACT
		(T)	.797	.598	.000	.199	192.00	4	(H2-1)	
7381	W14X145									COMPACT
		(T)	.788	.678	.000	.110	200.00	4	(H2-1)	

T3-47 All Conditions .5 Minimum Middle Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7382	W14X61									COMPACT
		(T)	1.205	.887	.000	.319	200.00	4	(H2-1)	
7383	W14X43									COMPACT
		(T)	.585	.518	.000	.068	.00	4	(H2-1)	
7384	W14X43									COMPACT
		(T)	1.011	.740	.000	.271	.00	4	(H2-1)	
7385	W14X61									COMPACT
		(C)	.629	.473	.000	.156	200.00	3	(H1-1)	
		(T)	1.440	1.078	.000	.363	200.00	4	(H2-1)	
7386	W33X201									COMPACT
		(T)	.523	.523	.000	.000	.00	2	(H2-1)	
7387	W14X61									COMPACT
		(C)	.536	.416	.000	.120	200.00	3	(H1-1)	
		(T)	1.427	1.066	.000	.360	200.00	4	(H2-1)	
7388	W14X43									COMPACT
		(T)	.978	.707	.000	.271	.00	4	(H2-1)	
7389	W14X43									COMPACT
		(T)	.507	.455	.000	.052	.00	2	(H2-1)	
7390	W14X61									COMPACT
		(C)	.634	.452	.000	.183	200.00	3	(H1-1)	
		(T)	.926	.687	.000	.240	200.00	2	(H2-1)	
7391	W14X145									COMPACT
		(T)	.815	.794	.000	.020	192.00	4	(H2-1)	
7392	W14X145									COMPACT
		(T)	.619	.512	.000	.107	192.00	2	(H2-1)	
7393	W14X145									COMPACT
		(T)	.583	.503	.000	.081	200.00	2	(H2-1)	
7394	W14X90									COMPACT
		(C)	.722	.707	.000	.015	.00	3	(H1-1)	
7397	W33X201									NON-COM
		(C)	.547	.352	.000	.196	276.00	3	(H1-1)	
		(T)	.890	.751	.000	.139	276.00	4	(H2-1)	
7398	G									NON-COM
		(T)	.832	.777	.000	.055	153.67	3	(H2-1)	
7399	G									NON-COM
		(T)	.842	.779	.000	.063	153.67	3	(H2-1)	
7400	G									NON-COM
		(T)	.799	.732	.000	.067	153.67	4	(H2-1)	
7401	G									NON-COM
		(T)	.780	.735	.000	.045	.00	4	(H2-1)	
7405	G									NON-COM
		(C)	.991	.902	.000	.089	76.84	3	(H1-1)	
7406	G									NON-COM
		(C)	1.082	.906	.000	.175	153.67	3	(H1-1)	
7407	G									NON-COM
		(C)	1.046	.978	.000	.068	.00	3	(H1-1)	
7408	G									NON-COM
		(C)	1.155	.982	.000	.173	153.67	3	(H1-1)	
7411	W14X74			fa > Fe						COMPACT
7412	W14X43			fa > Fe						NON-COM

T3-47 All Conditions .5 Minimum Middle Knee Braces

AISC SPECIFICATIONS, ASD 1989
AXIAL LOAD & BIAXIAL MOMENT INTERACTION STRESS CHECK

ELEM ID	SECTION TYPE	CHK TYPE	STRESS RATIO	= AXL	+ B33	+ B22	STATION LOCATION {in}	COMBO NO	AISC EQUATION	SECTION TYPE
7413	G									NON-COM
		(C)	.523	.499	.000	.023	.00	2	(H1-1)	
7414	G									NON-COM
		(C)	.539	.495	.000	.043	156.20	2	(H1-1)	
7415	G									NON-COM
		(T)	.927	.908	.000	.019	.00	4	(H2-1)	
7416	G									NON-COM
		(T)	.924	.905	.000	.018	156.20	4	(H2-1)	
7417	W14X43			fa > Fe						NON-COM
7418	W14X74			fa > Fe						COMPACT
7419	W14X74			fa > Fe						COMPACT
7420	W14X43			fa > Fe						NON-COM
7421	G									NON-COM
		(T)	.991	.973	.000	.017	.00	4	(H2-1)	
7422	G									NON-COM
		(T)	.991	.976	.000	.015	156.20	4	(H2-1)	
7423	G									NON-COM
		(C)	.727	.669	.000	.058	.00	4	(H1-1)	
7424	G									NON-COM
		(C)	.707	.674	.000	.034	156.20	4	(H1-1)	
7425	W14X43			fa > Fe						NON-COM
7426	W14X74			fa > Fe						COMPACT
7431	G									NON-COM
		(T)	.816	.739	.000	.076	153.67	4	(H2-1)	
7432	G									NON-COM
		(T)	.823	.742	.000	.080	.00	4	(H2-1)	
7433	G									NON-COM
		(C)	.963	.885	.000	.078	.00	3	(H1-1)	
7434	G									NON-COM
		(C)	1.048	.889	.000	.160	153.67	3	(H1-1)	
7435	G									NON-COM
		(T)	.680	.612	.000	.068	153.67	4	(H2-1)	
7436	G									NON-COM
		(T)	.681	.614	.000	.067	153.67	4	(H2-1)	
7437	G									NON-COM
		(C)	.958	.865	.000	.093	38.42	3	(H1-1)	
7438	G									NON-COM
		(C)	1.040	.869	.000	.171	153.67	3	(H1-1)	

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